Beliefs and Misbeliefs:

The Economics of Wishful Thinking

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Jean-Jacques Laffont Prize Lecture

Toulouse – December 2021

How Do People Form Their Beliefs?

1. Backward-looking, naive: trend extrapolation, adaptive learning
2. Rational expectations, Bayesian equilibrium and refinements
3. Fixed (wired-in) "biases and heuristics": base rate neglect, confirmation bias, law of small numbers, hot hand fallacy, probability weighting...
4. Motivated beliefs, cognition, reasoning: forms of self-deception
   - Held (or more likely to be) due to emotional or functional value
   - Resistant to evidence, but respond to costs, benefits and stakes
   - Other telltale signs of self deception / own-belief manipulation:
     – Information aversion: not willful blindness
     – Selective attention, retrieval, memory
     – Emotional responses, neural signatures

Beliefs and misbeliefs

- About the self:
  - Talent, intelligence, willpower, beauty, morality
  - Future prospects: success vs. failure, healthy vs. sick, happy vs. unhappy
  - Identity (where do I belong? what are my values, goals?)
- About how the world works:
  - Causes of inequality (effort vs. luck), social mobility, "Belief in Just World"
  - Ideology, e.g. merits of state vs. market, proper scope of government
  - What is moral or immoral, "taboo"
  - Other people: trust, in-group / out-group stereotypes
  - Religion, culture, vaccines, conspiracies
- Much evidence that often not formed and revised in a neutral, objective manner, but in part to serve important "needs"
  - Purely psychological, consumption value
  - Functional, instrumental

$\Rightarrow$ Beliefs as assets that people invest in, value, defend, expend, repair, etc.

Do they really believe (act on) it?

Wishful perceptions of health risks

- Oster et al. (2013): follow untested people at risk for Huntington's disease
  - If 1 parent has gene variation $\Rightarrow$ 50% chance of ultimately developing it
  - Updated based on symptoms. Or free, 100% accurate test

Figure 4. : **Perceived and Actual Risk of HD, by Motor Score**

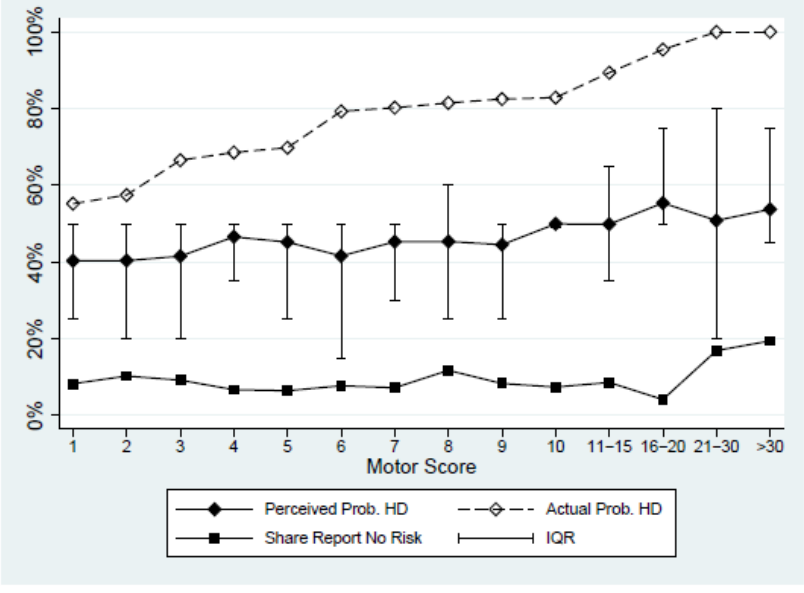
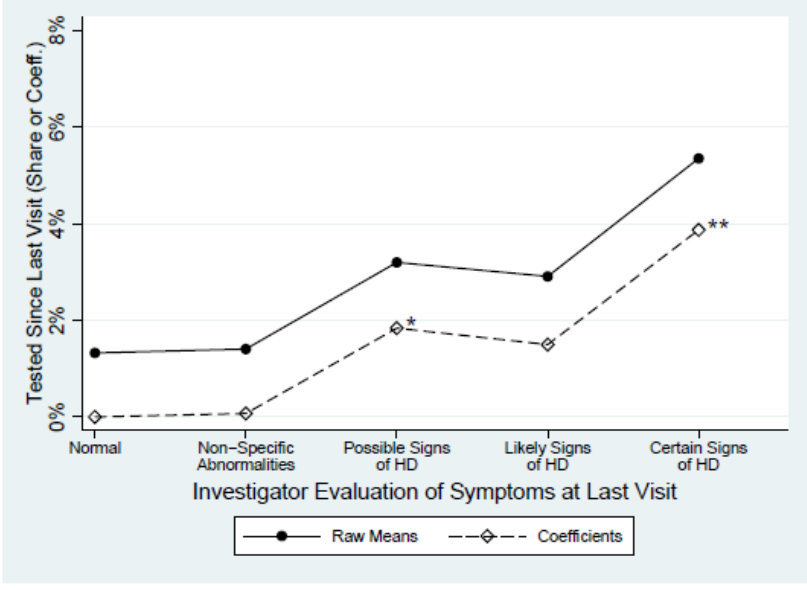


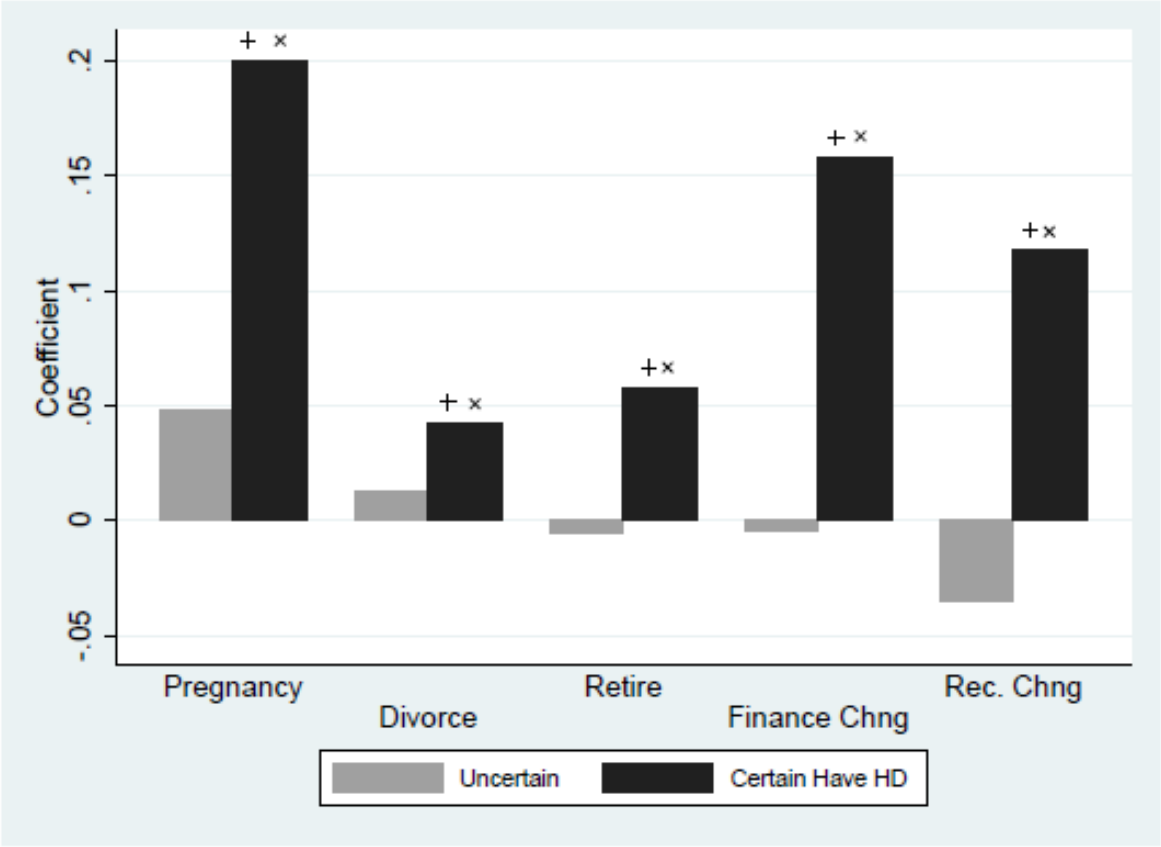
Figure 1. : **Testing Behavior and Investigator Evaluation of Risk**



- Information aversion: strong non-demand for testing
  - Also found for Herpes I and II testing

Behavior consistent with stated beliefs

Figure 5. : **Behavior Choice Relative to Individuals without HD Expansion**



- Covid: same. Patients about to be intubated, or even dying, still in denial Others finally ask for vaccine, too late
- Very high costs incurred to defend or "express" other beliefs: identity, religion

Outline

1. Simple unifying framework
   - Understanding self-deception: why and how
   - Motivated cognition vs. fixed heuristics & biases
2. Theory & predictions: individual beliefs
   1. Evidence from the lab: IQ, beauty, and politics
   2. Evidence from the field: store managers, fertility plans, financial investments
3. Theory & predictions: collective beliefs
   - Evidence from the lab: IQ, team performance
   - Evidence from the field: 2008 housing& financial crisis
4. Religion (si Dieu le veut...)

Understanding Self Deception

1. Why? (Demand side)

- Standard decision theory: better info $\Rightarrow$ single decision-maker better off
- Hedonic value of beliefs: Schelling's (1984) "mind as a consuming organ"
  - Self-esteem, ego, identity (Bénabou & Tirole 2002, 2011, Koszegi 2006)
  - Anticipatory utility, reassurance about future (Ackerlof & Dickens1982, Loewenstein 1989, Caplin & Leahy 2010) Brunnermeier & Parker 2005, Bénabou 2008, 2013)
- Functional value of beliefs
  - Self-motivation, self-control: worry about future selves' actions (Carrillo & Mariotti 2000, Bénabou & Tirole 2002)
  - Signaling: convincing oneself makes it easier to convince others

2. How? (Supply side)

- Ex-ante information acquisition or avoidance
- Ex-post signal distortion: "management" of attention, interpretation, recall
  - Either direct or via self signaling: own actions used as "diagnostics"

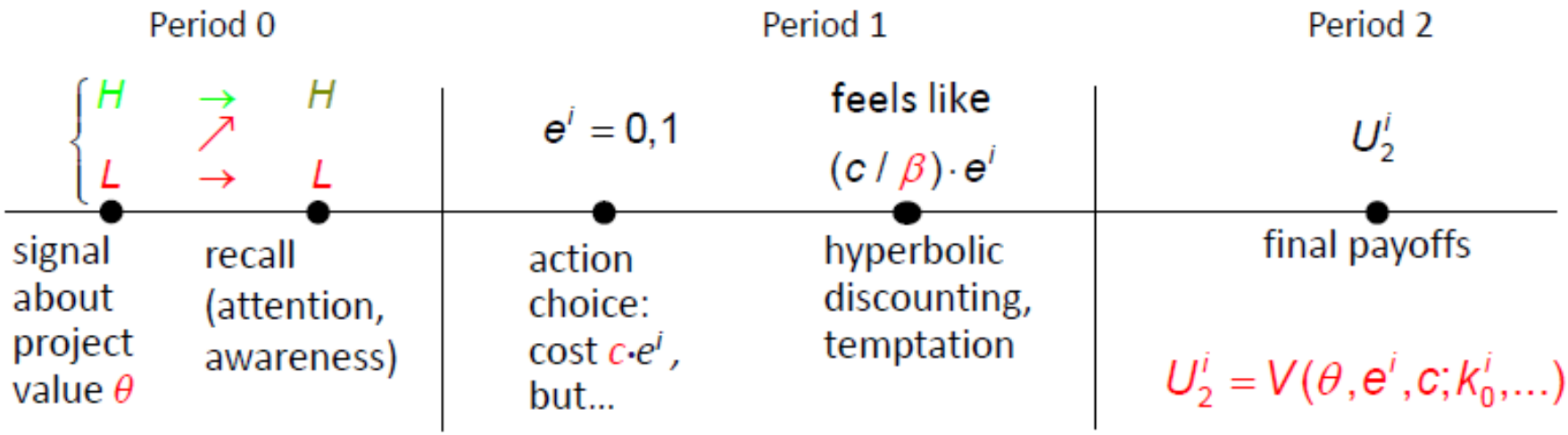
3. Welfare? Ultimately good/bad, functional or dysfunctional

Motivated cognition vs. fixed heuristics & biases

- Very different from mechanical biases and heuristics ("System 1")
  - Here: critical role of emotions/desires, both current and anticipated, interacting with cognition
  - Responds to incentives and stakes, whether economic or psychological / hedonic. But can leverage and hide behind cognitive limitations and errors
  - More cognitively sophisticated or educated people may be better at maintaining, defending desired beliefs
- Consistent with line in psych. that re-emphasizes role of emotions, especially those evoked by future good and bad prospects
  - Damasio (1994): emotions, esp. in anticipating future situations, are critical to making even good decisions; sometimes, bad ones
  - Neuroscience; growing literature on processes underlying motivated beliefs, selective memory / asymmetric updating

A Simple Unifying Framework

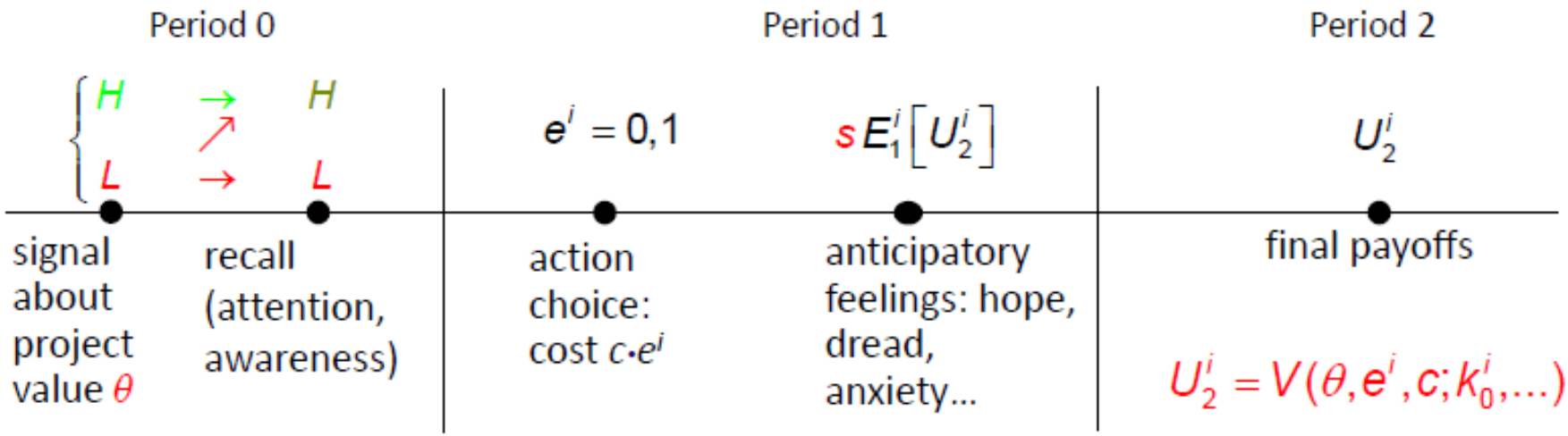
Self efficacy / motivation and self deception (B &T 2002)



- In period 1, will face temptation to slack off, give up, cheat, overconsume...
- Return (long-term value, effectiveness) of endeavor is imperfectly known: depends on ability, probability of survival of individual or social relationship
- Maintaining a "positive view" of that return helps enhance, preserve motivation $\Rightarrow$ benefit to selectively process (encoding, recall, awareness) good vs. bad news. But also risks
  - "Believe what is in the line of your needs, for only by such belief is the need fulfilled. Have faith that you can successfully make it, and your feet are nerved to its accomplishment." (W. James)

A Simple Unifying Framework

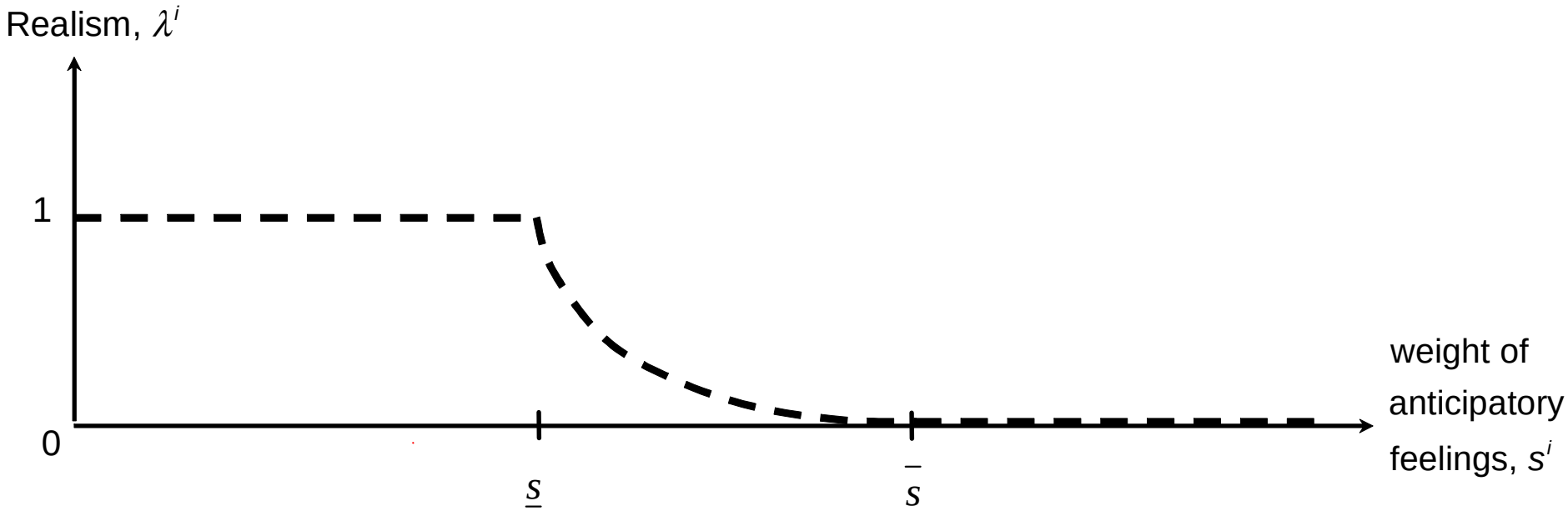
Anticipatory feelings and self deception (B-T 2011, B 2013)



- In period 1, will experience hope, dread, anxiety about long-term outcome, welfare; or self-esteem. "Consuming" beliefs.
- That welfare will depend on decisions taken and their returns (hence on ability, durability of relationships, etc. Also, on initial endowment of (human, social, professional) capital k_0^i
- Maintaining a "positive view" of future outcomes has hedonic benefits $\Rightarrow$ benefit to selectively process (encoding, recall, awareness) good vs. bad news. But also distorts decisions $\Rightarrow$ costly mistakes
  - "Pour briser les assauts renouvelés de ma mémoire, travaillait utilement en sens inverse mon imagination."(Marcel Proust)

Responding to bad news

- *Realism* = probability that recalls / remains aware of, and correctly acts upon, unwelcome news. *Denial* = opposite



- Self-motivation vs. anticipatory-feelings version: replace "stakes" s with "weakness of will"
- Agent trades off costs vs. benefits (psychological, instrumental) of censoring, disregarding bad news
- Later: also affect by how others' realism or denial given bad news, red flags

Main Predictions: Individual Behavior

- Ex-post, asymmetric updating for good vs. bad news: denial, rationalization, wishful thinking. Evidence on biased recall, awareness, beliefs?
- Ex-ante, information avoidance: willful blindness, pay to not know
- Selective awareness, biased updating more likely for beliefs relevant to:
  - Decisions for which cost of mistakes is smaller, e.g. because individual less likely to be pivotal: voting
  - Issues on which final resolution ("day of reckoning") further into the future
  - Tasks for which perseverance in spite of temptation is more of an issue
  - Fixed or long-lasting forms of "capital": intelligence, health, attractiveness, honesty, social or cultural capital, ethnic identity, specialized human capital
  - More illiquid asset, or/and for which bad news are very bad
- $\Rightarrow$ Stakes-dependent beliefs

Stakes-dependent beliefs: further implications

- Endowment effect: have k_0^i (wealth, social or cultural capital, etc.) $\Rightarrow$ persuade myself will yield high return or future utility
- Escalating commitment: once think k^i asset is good for me, accumulate more of it, hence higher stakes in being optimistic about its long-term value to me, etc.
- Hedonic treadmill: such escalation may actually reduce utility, yet be unavoidable. Pursuit of wealth, fame, "purity"...
- Self-traps: same or similar person can be in a mode of
  - "Positive thinking": optimism, "can-do" attitude, rosy glasses...
  - "Being honest with yourself": acknowledge failures and limitations. Cautious, even depressed
- EVIDENCE? Fast-growing literature, focus on recent / brand new papers

Asymmetric updating about oneself

- "The Good News-Bad News Effect" (Eil & Rao 2011)
- Links to older tradition in psychology: self-serving use or recall of information on health (Kunda 1987), bargaining (Babcock et al. 1995)
- A word about belief elicitation in economics...
- Stage 1: collect info to rank the subjects on intelligence (IQ tests) or beauty (speed dating). Control condition: random number from 0 to 9
- Stage 2:
  - Subjects state their prior belief, in %, for being in each of 10 deciles
  - Two rounds of:
    (a) Learn if rank above / below other randomly selected, anonymous subject
    (b) State your updated belief about your decile
- Stage 3: elicit willingness to pay to learn / not learn true rank

Actual vs. rational (Bayesian) updating

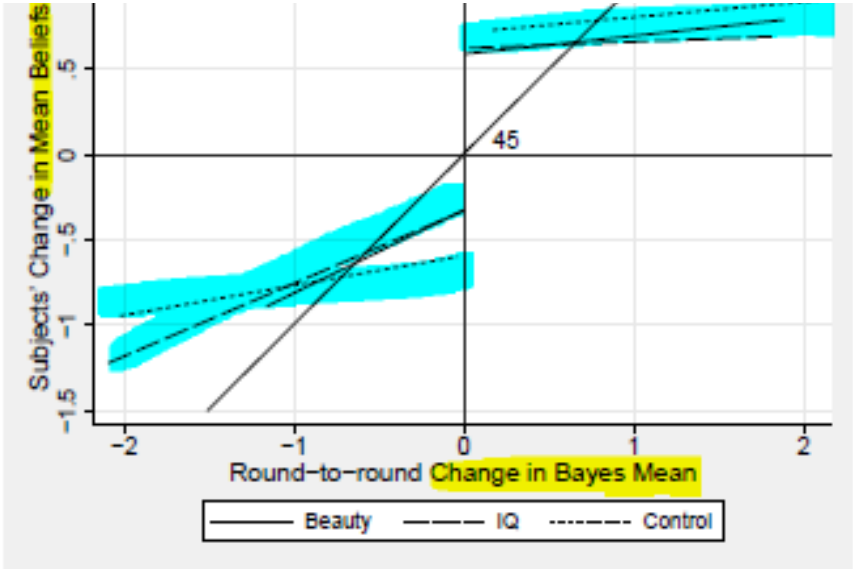


FIGURE 3. LINEAR FITTED VALUES OF ROUND-TO-ROUND CHANGES IN MEAN BELIEF BY CONDITION.

1. Update close to Bayes' rule for positive signals, underupdate for negative signals. But only when about something have a stake in.
2. Buy information when have relatively optimistic beliefs about, pay to avoid it when have pessimistic beliefs
3. No evidence of confirmatory bias: valence of signal matters

- Möbius et al. (2014): similar experiment (on IQ only). Find underadjustment even to good signals, but significantly more to negative ones

The Fake News Effect: Experimentally Identifying Motivated Reasoning Using Trust in News (Thaler 2020)

- Let x be some objective number: either "loaded" (relative IQ, by how much unemployment went up/down during some president's administration, or crime following some gun law, etc.), or "neutral", (geography)

1. Elicit each subject's initial median belief about x: guess g such that she puts 50% probability on $x > g$ and 50% on $x < g$. Equally willing to bet on either
2. Subject gets a message that either says *"x is above your guess g"*, or *"x is below your guess g"*. With known probability 50%, message comes from a source (computer) that always states truth, and with 50% from one that always lies
3. Elicit (incentivized):
   - S's probability assessment that message received was real, vs. fake news
   - Her updated median belief, g', about x.

- Variant: get both contradictory messages simultaneously. Then, bet on which one is more likely to be true, and finally state updated median as before

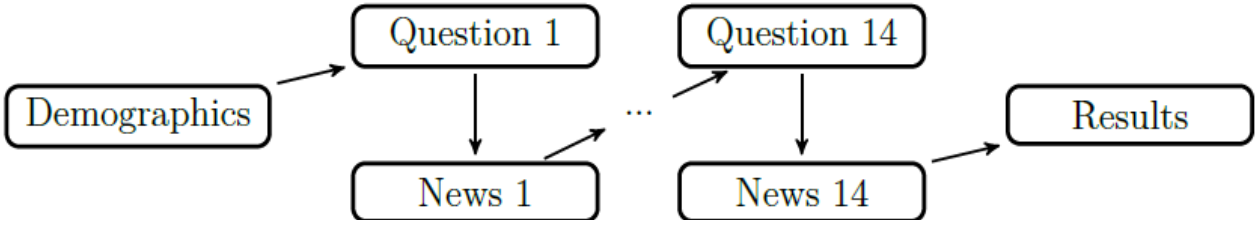
Examine:

- How will subjects assess the reliability of real and fake news, depending on whether they align or contradict their likely motivations?
- How will their revised beliefs respond to these different types of news?
- Sharp test: For a Bayesian, and even a non-Bayesian suffering from most common "mechanical" biases and heuristics (confirmation bias, base-rate neglect, etc....), there is absolutely nothing to infer from such a message, whether about the source's reliability, or about x itself
- And indeed, in the experiment ($N \approx 1,000$, online), when x concerns a "neutral" issue, subjects do not update much about either source veracity or the question at hand (x) : most of them understand that there is zero information in the message
- When x is a sensitive, loaded issue...

News you will like, or dislike

Topic	Pro-Democrat Motives	Pro-Republican Motives
US crime	Got better under Obama	Got worse under Obama
Upward mobility	Low in US after tax cuts	High in US after tax cuts
Racial discrimination	Severe in labor market	Not severe in labor market
Gender	Girls better at math	Boys better at math
Refugees	Decreased violent crime	Increased violent crime
Climate change	Scientific consensus	No scientific consensus
Gun reform	Decreased homicides	Didn't decrease homicides
Media bias	Media not mostly Dems	Media mostly Dems
Party performance	Higher for Dems over Reps	Higher for Reps over Dems
Own performance	Higher for self over others	Higher for self over others

Table 1: The list of topics and hypothesized motives in the experiment.



Stakes-dependent beliefs

Figure 2: Politically-Motivated Reasoning: News Direction and Partisanship

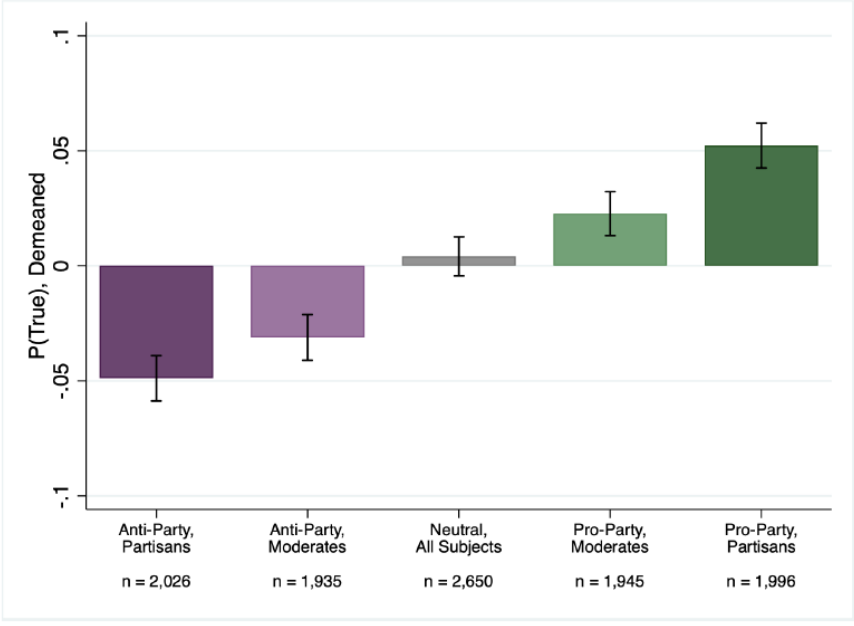
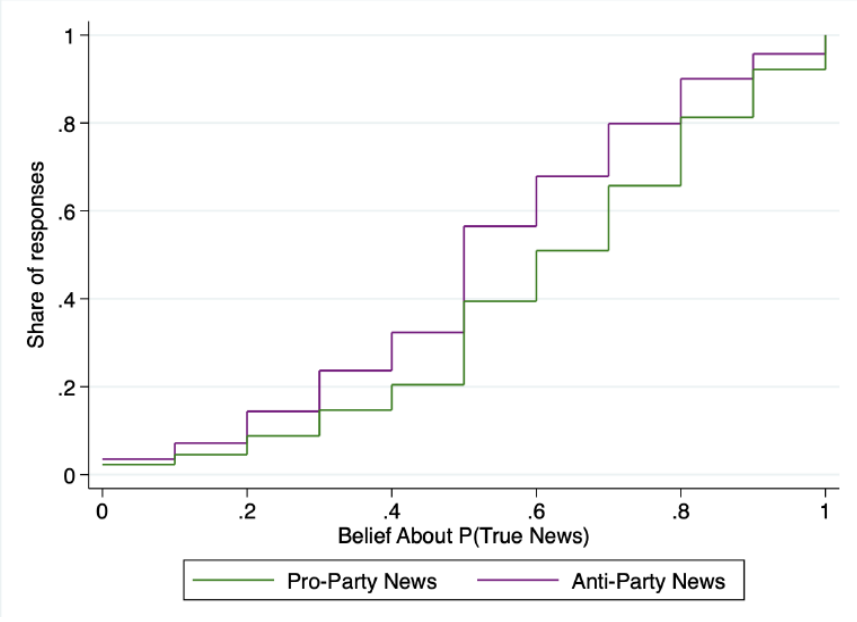
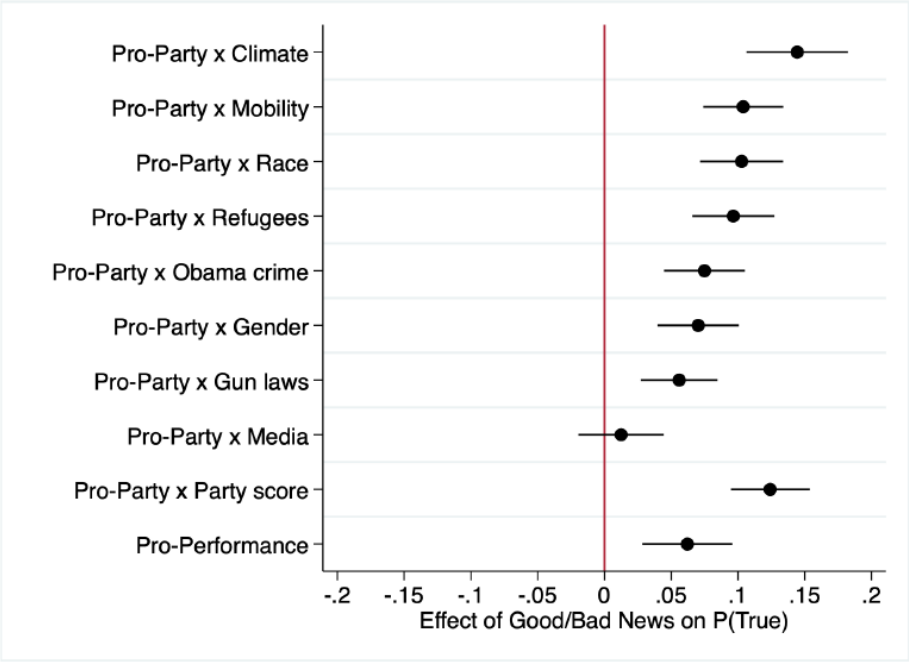


Figure 1: CDF of Assessments of Pro-Party and Anti-Party News



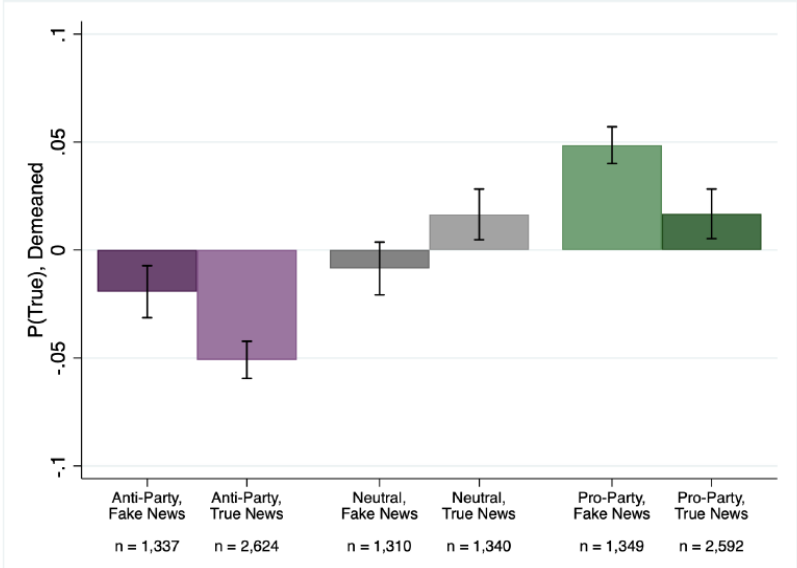
- Subjects who affiliate with or just "lean" Republican / Democrat believe (bet) that the computer source is the truthful one when its message is "Pro-Party", and the untruthful one when it "Anti-Party"
- Unmotivated confirmation bias, base-rate neglect, etc., cannot account for results Nor can confusion or "lazy thinking" about what a median means

Figure 4: Motivated Reasoning by Topic



Notes: OLS regression coefficients, errors clustered at subject level. FE included for subject, round number, and topic. Pro-Party (vs. Anti-Party) news is defined in Table 1. Error bars correspond to 95 percent confidence intervals.

Figure 3: Motivated Reasoning and Assessments of Fake News



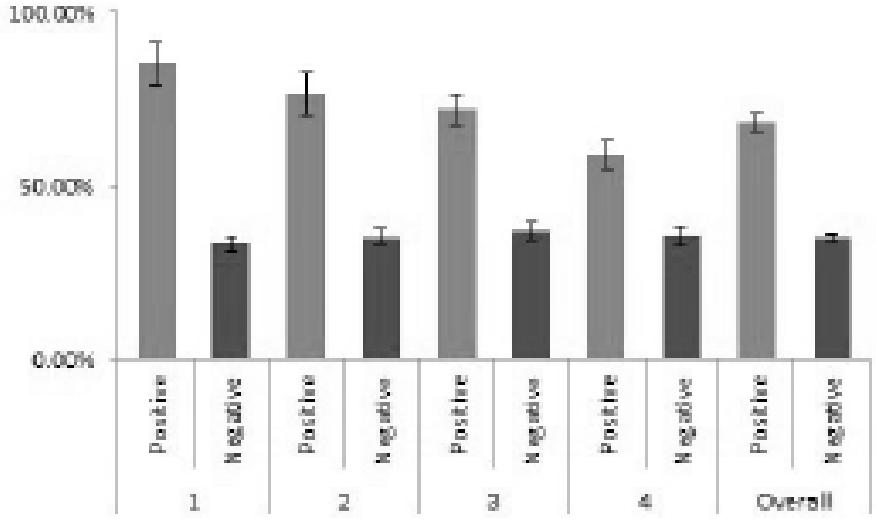
- Motivated reasoning found for 9/10 political issues. The more partisan / politically identifying the subject is, the stronger their belief in fake pro-party news, and disbelief in true anti-party news
- Same self-serving bias for own performance (men only)
- Updated beliefs assessment / "following the message" about the issue x: similar bias, mediated by motivated credence in source

Asymmetric recall of past performance

- "Selective Memory & Motivated Delusion" (Chew, Huang & Zhao 2020)
- Stage 1: 621 subjects, 4 questions each from Ravens IQ test; incentivized
- Stage 2: Two months later, called back, showed same 4 questions + 2 had never seen, with the answers
  - Asked to recall whether answered correctly, incorrectly, had not seen, or can't remember. +\$1 for correct response, -\$1 for incorrect, 0 for "can't remember"
- 8 possible types of recall errors: "Amnesia" $(s \to \varnothing)$, "Confabulation," $(s \to \sigma')$, "Delusion" $(s \to \sigma)$

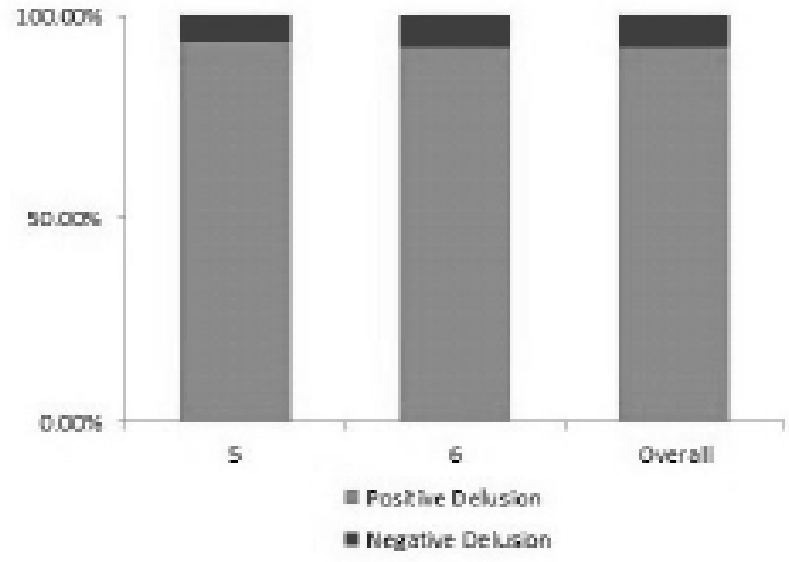
	a	b	c	d
$s = G$	a_G : CR	b_G : Negative C	c_G : Negative A	d_G : Weak Negative A
$s = B$	a_B : Positive C	b_B : CR	c_B : Positive A	d_B : Weak Positive A
$s = \varnothing$	$a_\varnothing$: Positive D	$b_\varnothing$: Negative D	$c_\varnothing$: CR	$d_\varnothing$: Weak CR

Positive Amnesia vs. Negative Amnesia



a

Positive Delusion vs. Negative Delusion



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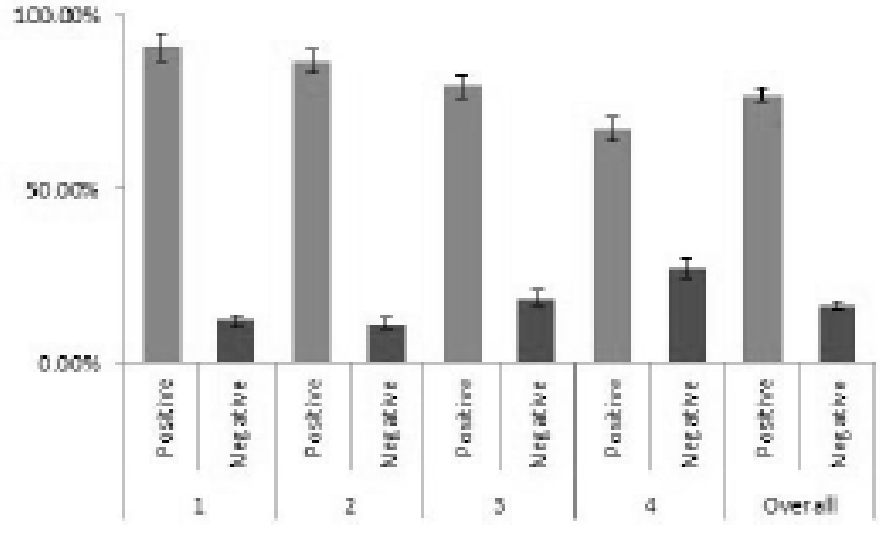
Positive Confabulation vs. Negative Confabulation



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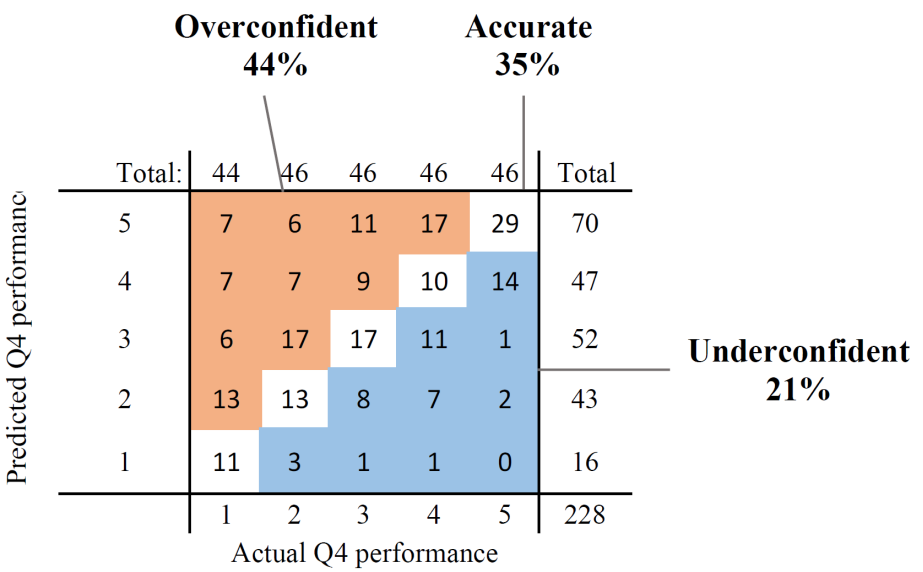
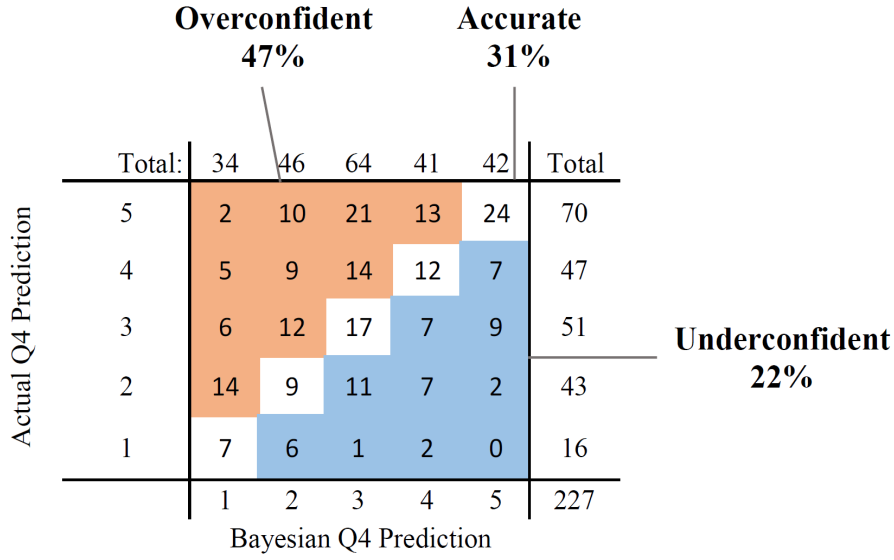
From the lab to the real world

- Persistent Overconfidence and Biased Memory: Evidence from Managers (Huffman, Raymond & Shvets 2017)
- 239 managers, each running separate food/beverage store. Each quarter, firm runs tournament incentive scheme, regional/national, determining bonuses
  - High stakes: range up to 150% of base salary, 50% of monthly income
  - Repeated feedback, well-defined performance criteria, familiar activity known group of competitors
  - Researchers observe 31 quarters of performance & feedback
- Measure managers' (incentivized):
  - Predictions of own next-quarter performance (most likely quintile) in this real workplace tournament. (predictions confidential vis-a-vis firm)
  - Recall: previous quarter's performance (rank +/-10)
  - Types: traits, preferences, and ability of managers measured using surveys, experiments, and historical data

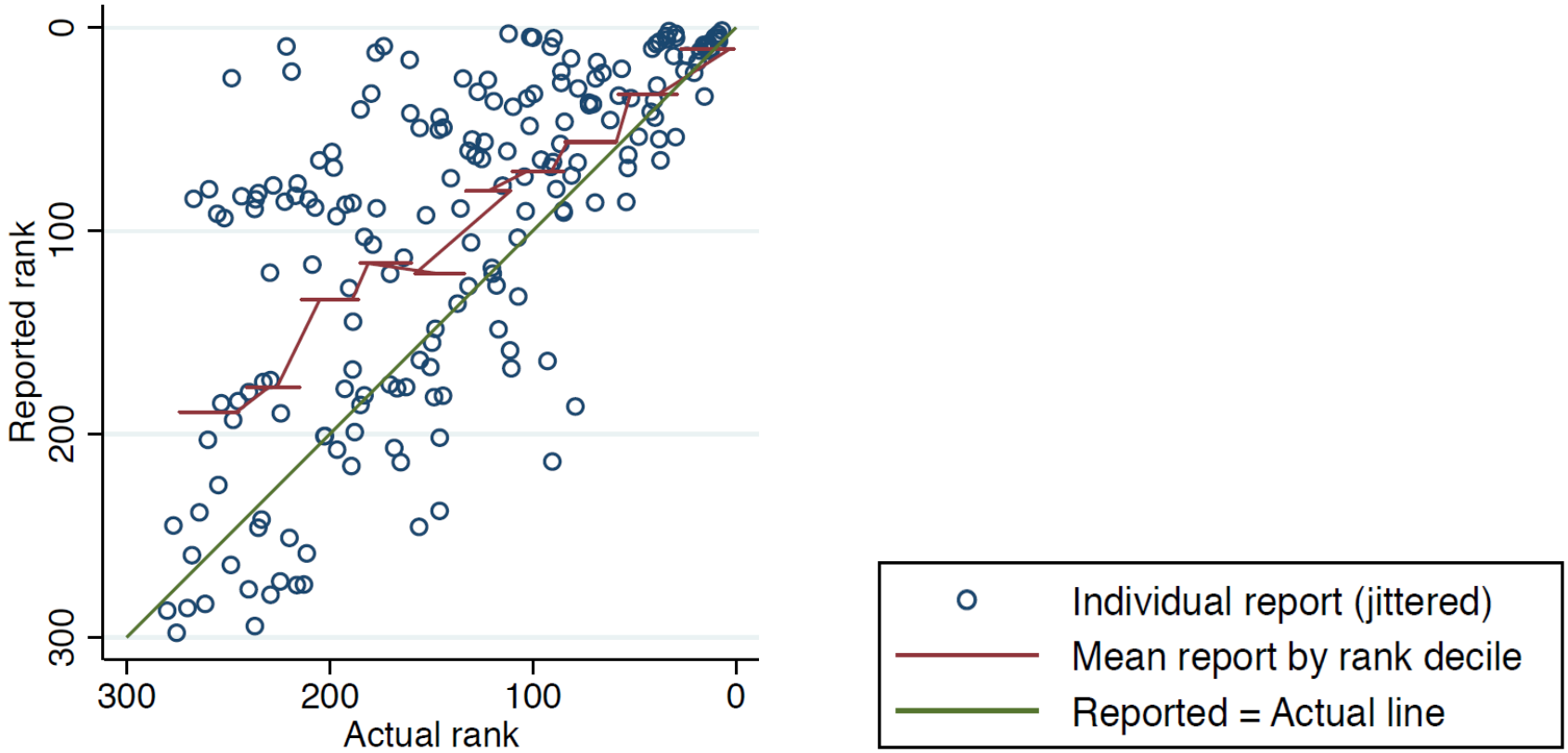
Overconfidence about future (2015-Q4) performance





- Significant overoptimism with respect to both:
  - Actual later performance (ex-post)
  - Optimal prediction based on all the available history (31 quarters, controls)
- Less than 0.1% chance that Bayesian model would generate observed predictions

Biased recall of past (2015-Q2) performance



- Recall correlated with actual, 0.67, but significantly different ($p < 0.1\%$). Forgetting more prevalent for worse ranks
- 68% of managers recall better-than-actual rank. Median deviation is 9% improvement on actual. Size of deviation increases as performance worsens

Main Findings

1. Overconfidence in own performance predictions, even for managers with substantial experience, and too extreme to be rational

2. Inaccuracy in recalling recent past performance

   (incentives + they know that experimenter knows it!)

   - Forgetting is more likely if recent performance was bad (controlling for historical ability)
   - Errors in recall are skewed heavily towards better than actual performance

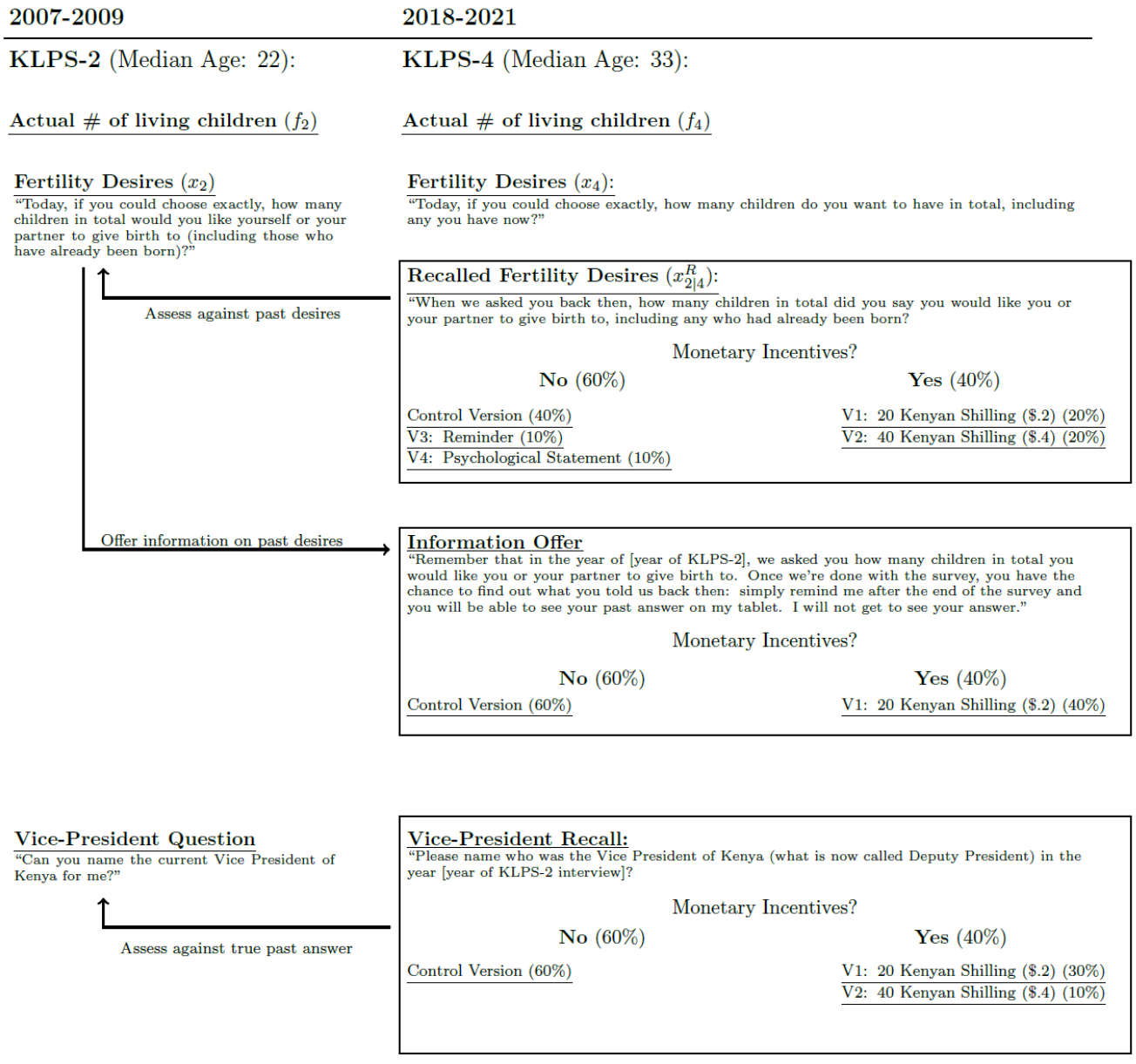
3. Predictions about the future are related to recalled past performance (conditional on actual performance) $\Longrightarrow$ see "reality denial" in action

4. How does overconfidence about 2015-Q4 relate to performance in early quarters of 2016?

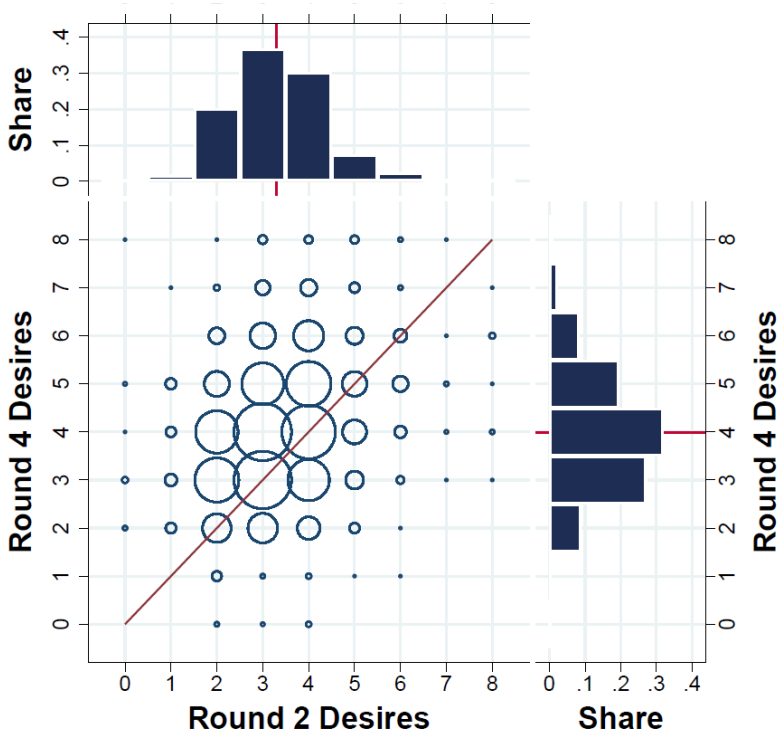
   - No significant relationship to overall rank, but signs of $\neq$ "managerial styles":
   - Overconfident managers do better in terms of quarterly profit, but have lower ratings for customer service

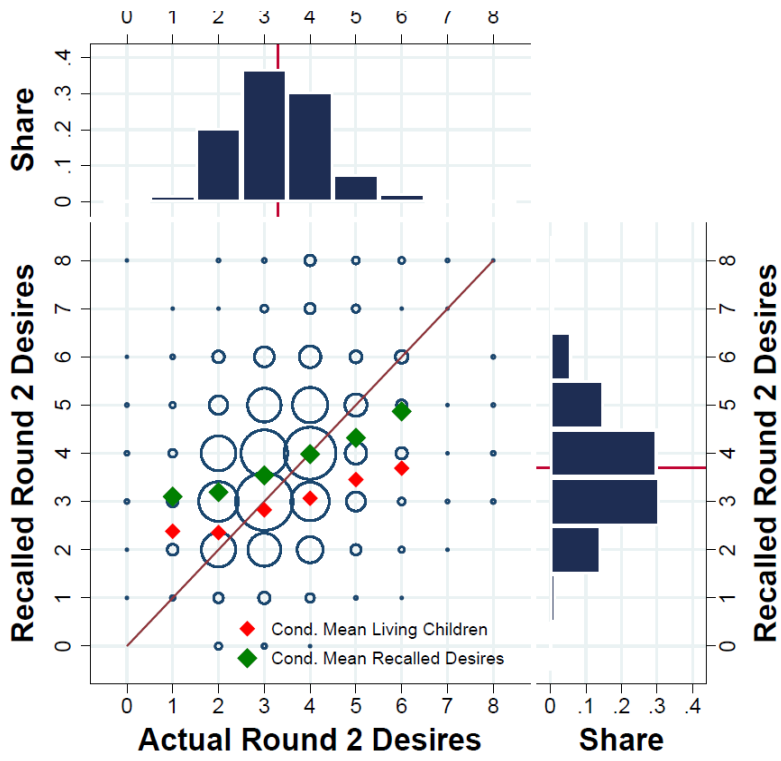
Selective Memory on Fertility Decisions - Müller 2021

- 4,000 Kenyans, farming region, interviewed at 22 and again at 32. Asked to recall age-22 fertility plans



Plans, realities, and recalls

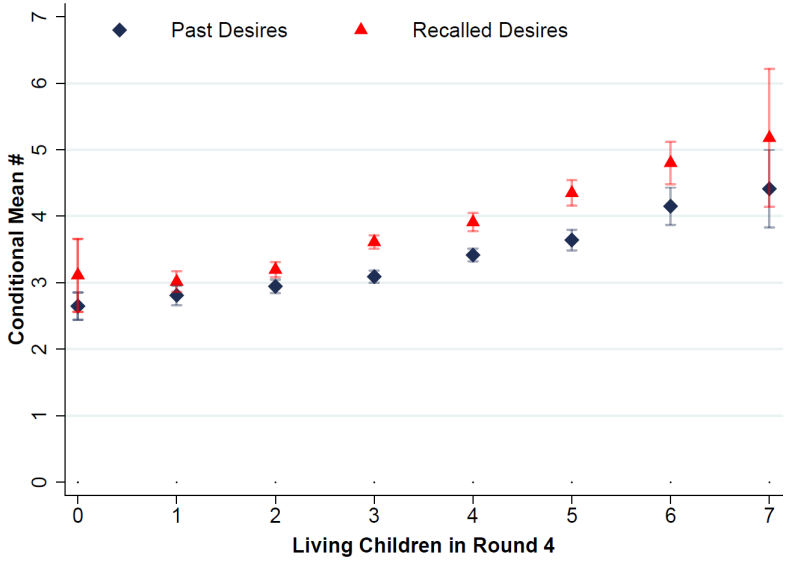




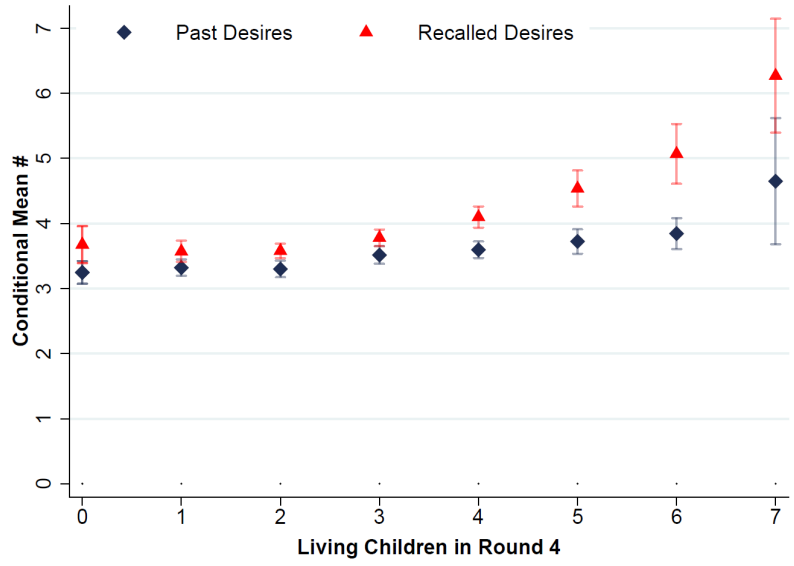
- Average desired lifetime # children at 22 is 3.3
  - By 32 is 4.0, with and many fertility years left
- At 32, average *recall* of age-22 desire is inflated to 3.7

Plans, realities, and recall

(a) **Women**

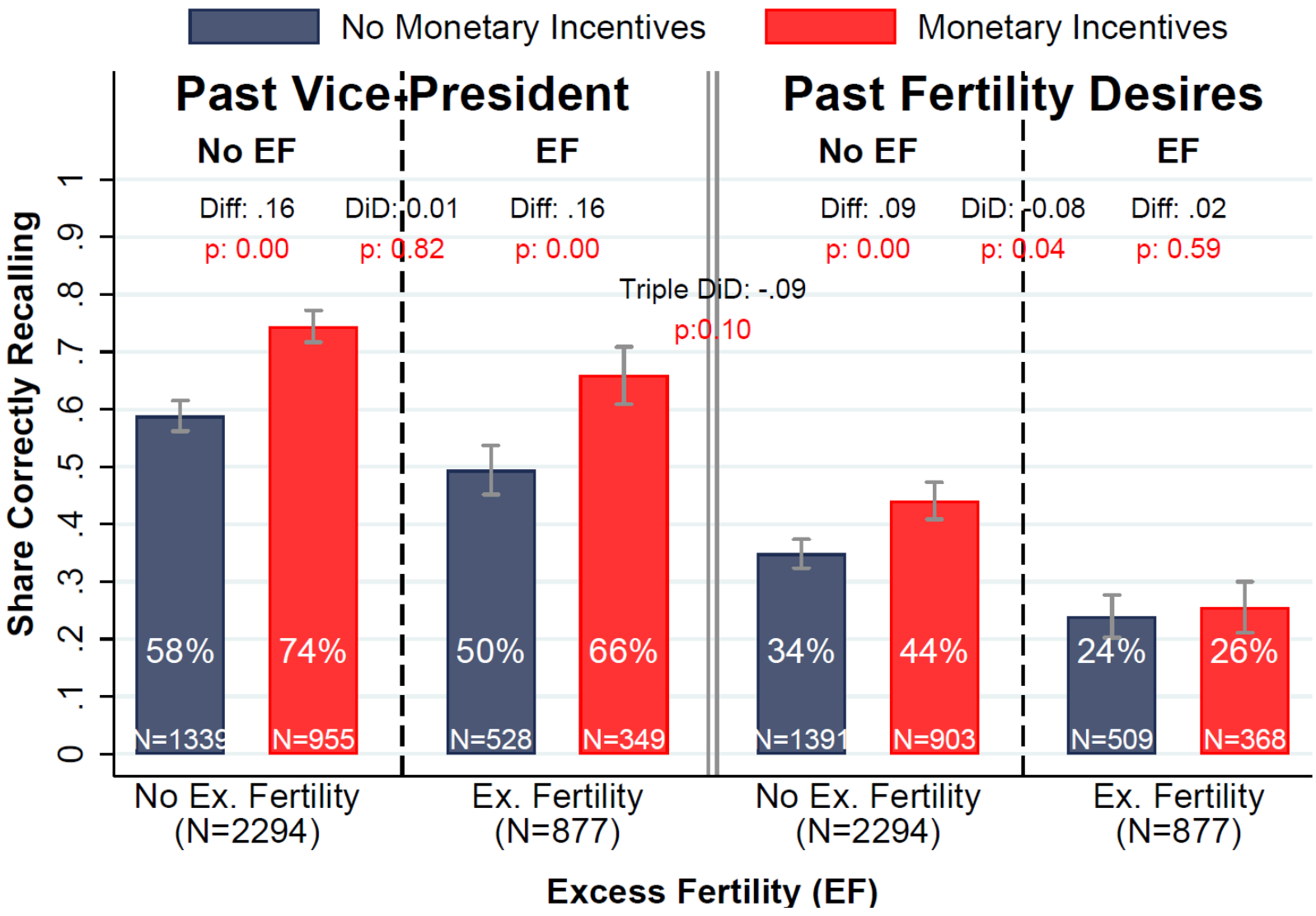


(b) **Men**



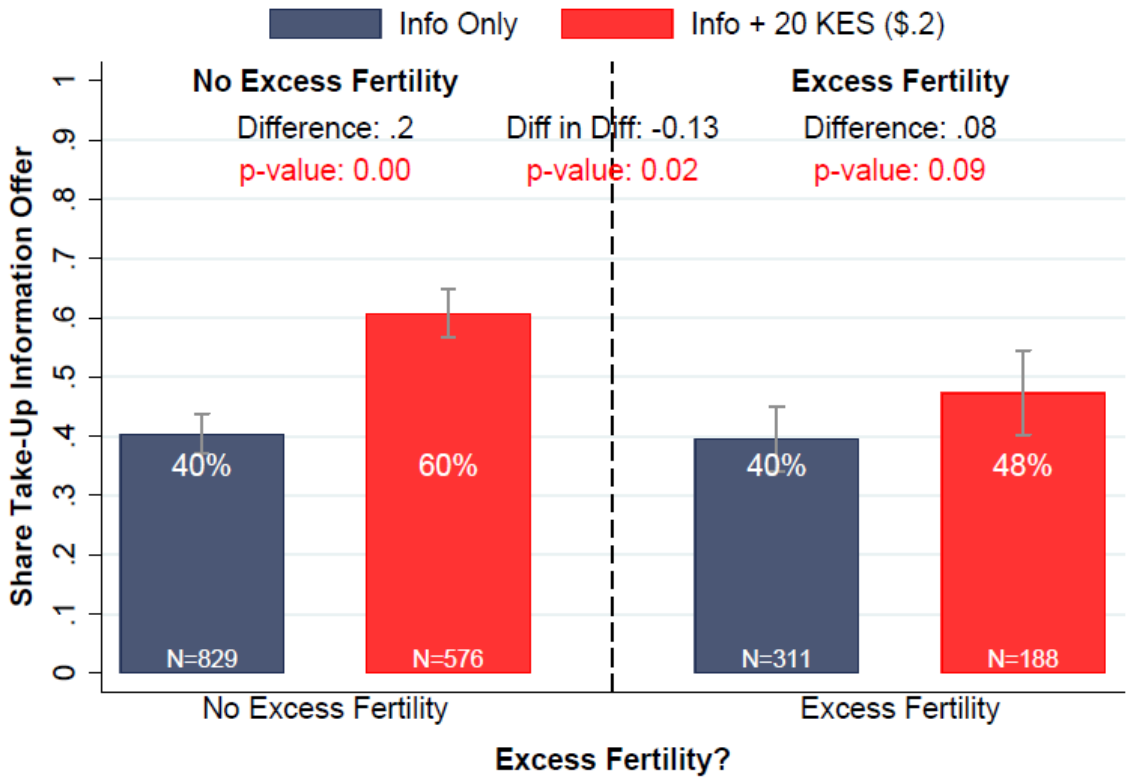
- Recalled desired $\approx$ **40%** actual plan + **60%** how it turned out.
- Mostly driven by those for whom actual $>>$ desired
- Even more striking given that desire at 22 often expressed as upper bound

Higher incentives for better recall?



How badly do you want to not know?

- If you ask at the end, will: (i) tell you what your age 22 plan actually was; (ii) tell you + pay you extra 1/2 median hourly wage. Who asks?



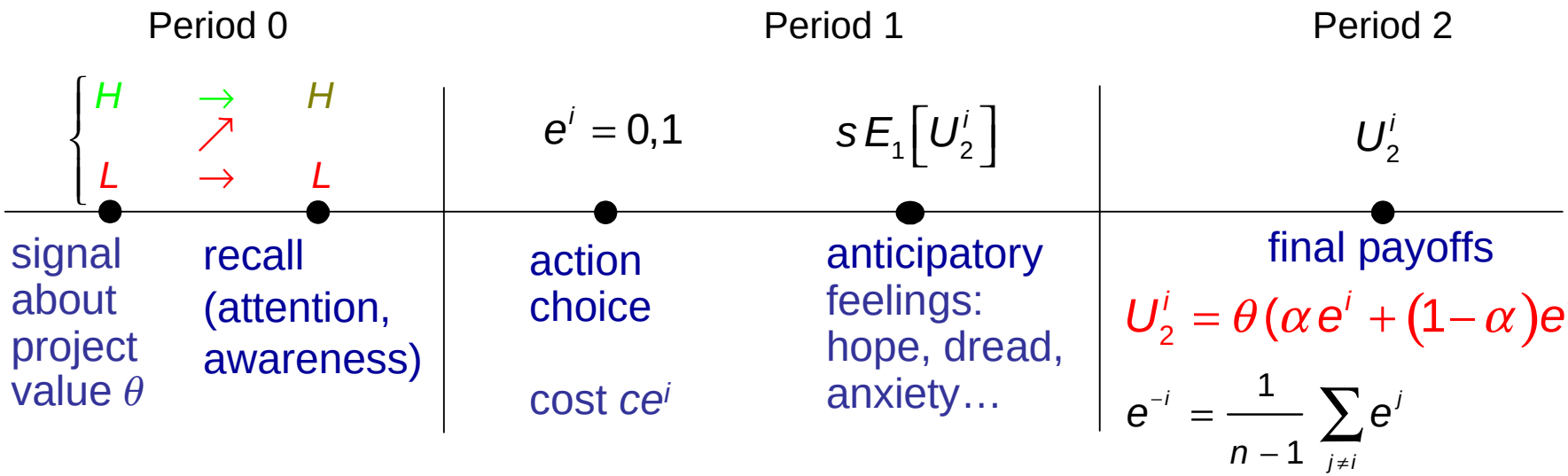
- Here again: biased recall + information aversion. Alternative is facing that:
  (i) Not really in control of own fertility, life
  (ii) Among your living children, this many were not wanted, at least initially
- (iii) Probably, more to come

Social Cognition - Organizational Beliefs

- "The Columbia accident is an unfortunate illustration of how NASA's strong cultural bias and its optimistic organizational thinking undermined effective decision-making." (Columbia Accident Investigation Board, 2003)
- "Merrill color-blind in a sea of red flags" (NYT, May 2008)
- "General Motors' saga was one of decline and denial" (WSJ, June 2009)
- "The audit found that [the SEC's Division of] Trading and Markets became aware of numerous potential red flags prior to Bear Stearns' collapse ... but did not take actions to limit
  these risk factors." (Inspector General's Report, 2008)
- Shiller (2005): "new economic era thinking". Suspension of disbelief: housing prices (households), default rates (lenders, regulators), assets risk and ability to get them off balance sheet (banks). Madoff investors... Before: Internet bubble,...etc. Recurrent patterns.
- Reinhart-Rogoff (2009): "The ability of governments and investors to delude themselves, giving rise to periodic bouts of euphoria that usually end in tears, seems to have remained a constant [since 1800]

Groupthink: Collective Delusions in Organizations / Markets

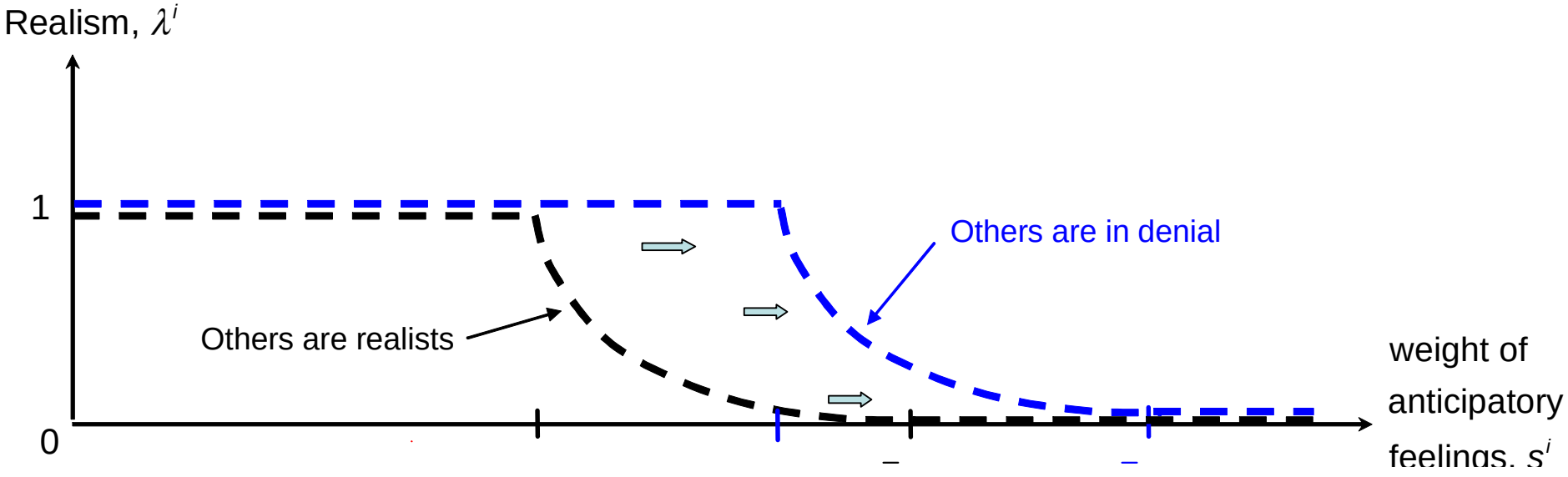
- Bénabou (2013): what interaction structures lead (mis)beliefs to spread, or on the contrary to dampen across agents?



- Take here simplest interaction / organization structure; can enrich substantially (asymmetries, complementarities / substitutabilities)
- Stakes now endogenous: how I will fare depends on what others will do, hence on what they choose to believe following bad news, red flags
- New question: how will my beliefs depend on others' realism or denial? When are delusions contagious?

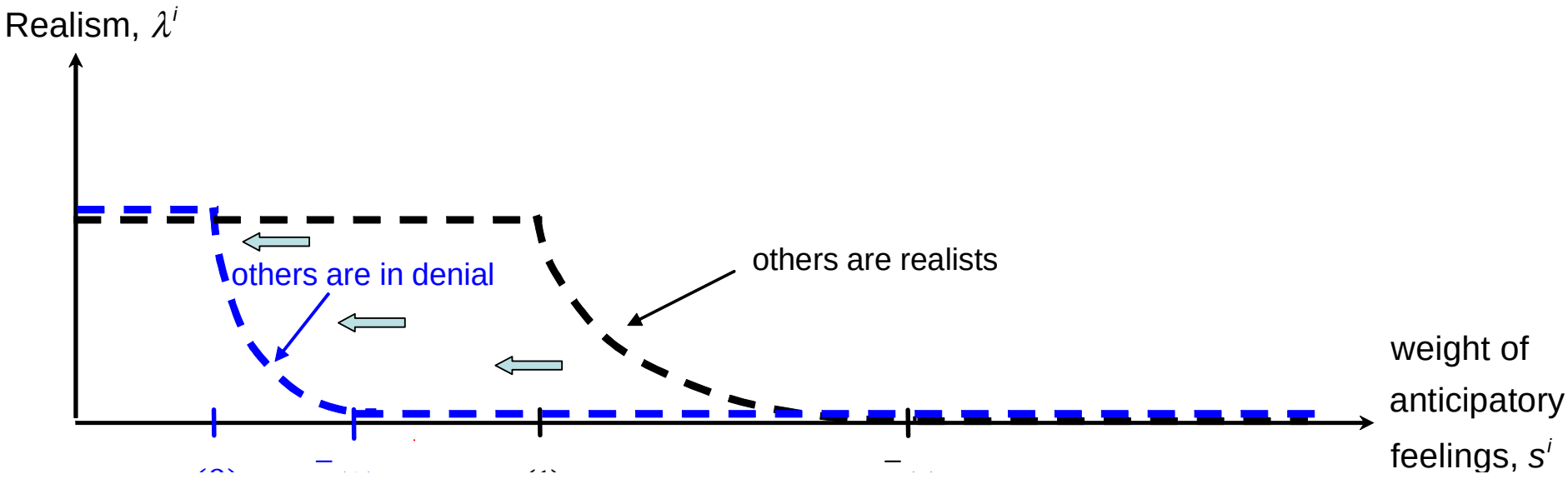
Case 1: low-risk project, team effort, public goods

- In low state / given bad news, persevering still has positive expected social value, but below private cost: sports team, traditional business...
- Others' disregard of bad news leads them to act in a way that is *better for me* than if they were realists $\Rightarrow$
  - makes those news less bad, easier to accept
  - reduces incentive to engage in denial



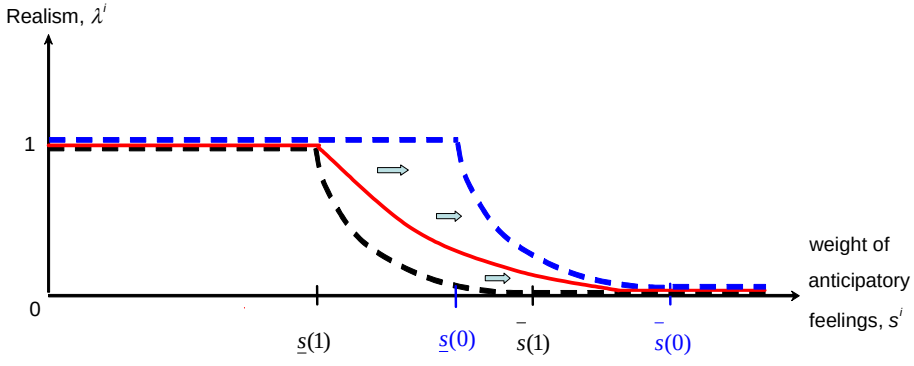
Case 2: high-risk project or strategy (corporate, political...)

- In low state / following bad news, persevering has negative expected value, both social and private: Enron, "creative" finance, global warming
- Others' reality denial leads them to make things *worse* for me than if they were realists, limiting the damage⇒
  - future prospects become even more scary, harder to face
  - increases incentive to look the other way

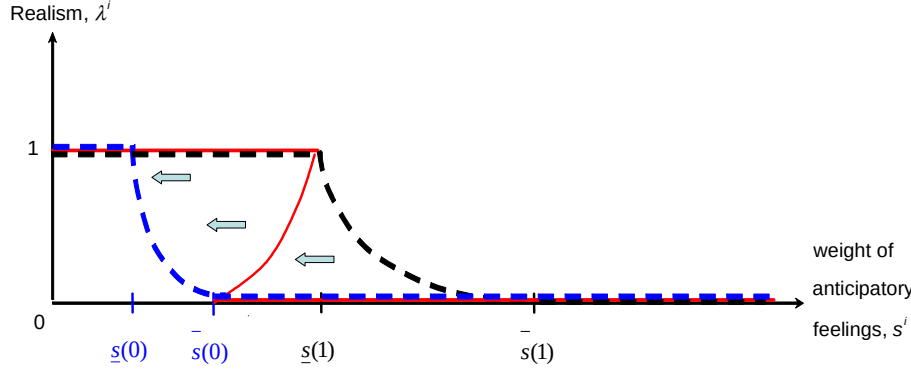


Mutually Assured Delusion (MAD) Principle

- When reality denial or avoidance by others is beneficial, it is self-dampening (strategic substitutes)
- When reality denial or avoidance by others is harmful, it is self-amplifying (strategic complements)
- Social cognition: in equilibrium, everyone's beliefs about a common reality (cognitive strategies) adapt to those of others, and vice versa $\Rightarrow$
- Beneficial group morale spreads with difficulty, harmful groupthink is contagious!



Social Cognition: Group Morale



Social Cognition: Groupthink

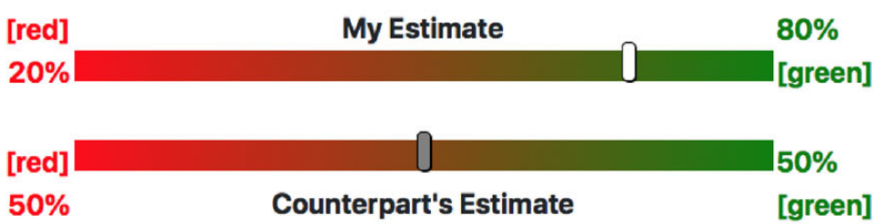
Main Implications

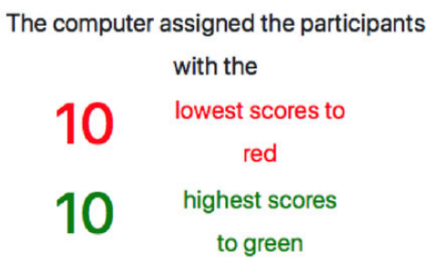
1. Both collective realism and collective denial can coexist as social equilibria
   - Can see this across organizational and corporate cultures. All persist in ignoring red flags, pursuing wrong course of action –because others do
2. Contagious groupthink is more likely when:
   - More "common fate": greater interdependence, few exit options $(\alpha \downarrow)$
   - High tail risk, "black swans": low probability of *very* bad events $(1 - q \downarrow \theta_L \downarrow)$
3. Cognitive "trickle down" in hierarchies
   - A person's fate, hence optimal beliefs, influenced most by how some key people deal with bad news, red flags. Manager delusions hurt workers $>>$ the reverse $\Rightarrow$ worldview of the former will contaminate that of the latter

- Other applications: climate-change denial, fatalism about poverty...

Social Exchange of Motivated Beliefs

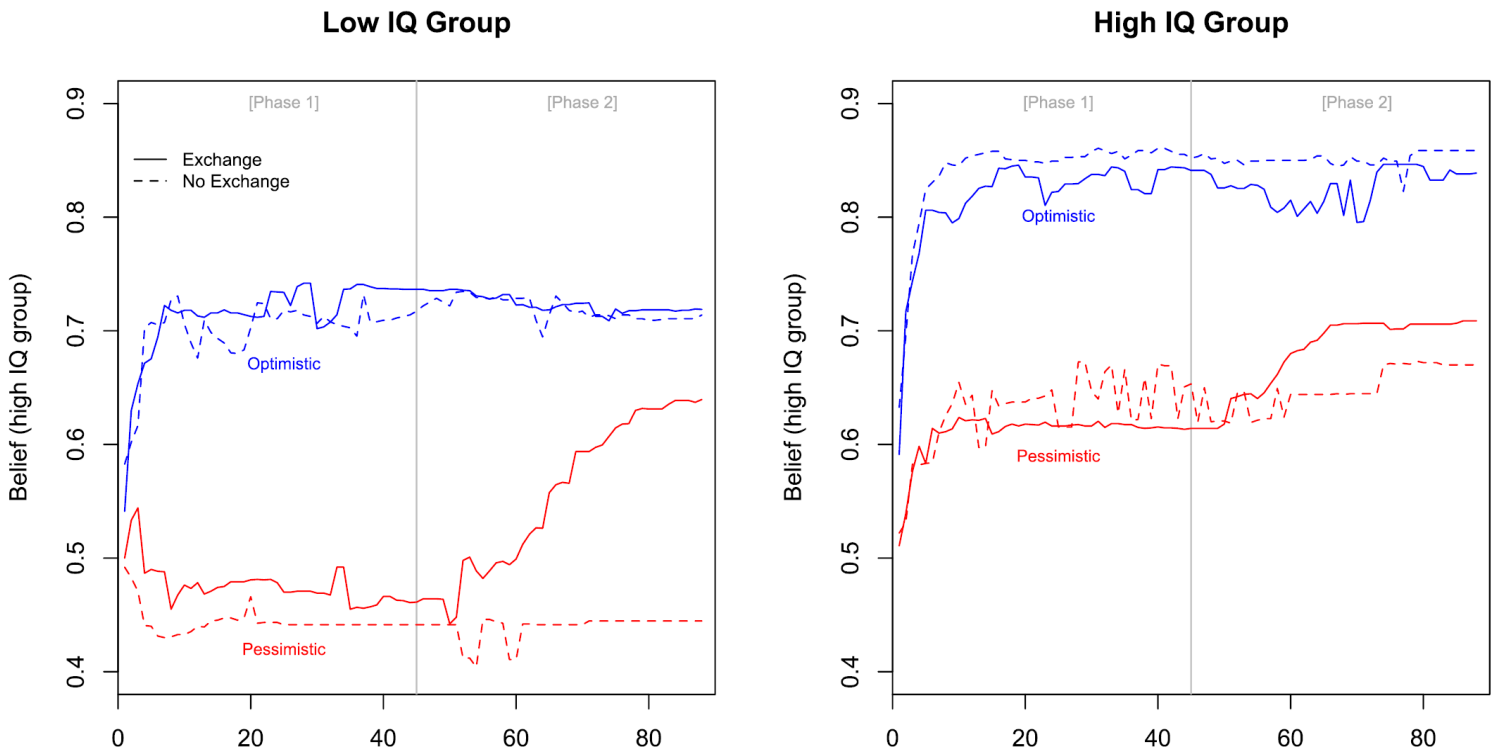
- Oprea &Yuksel (2021): are belief biases amplified or alleviated by social observation among people who share similar motivations? Experiment:
  1. Take IQ test (Raven matrices)., then assigned to Green or Red group:
     - In *Motivation (M)* treatments, Green group = those with IQ score above median, Red = those below median
     - In *No Motivation (NM)* treatment, 50-50 chance of being in Green or Red
  2. Phase1 : from seconds 1-44, each provides own estimate of probability that is in Green or Red group, using slider. Incentivized
  3. Phase 2: at 45', subjects in *Exchange (E)* treatments paired with another subject assigned to same group, from there on also see partner's estimation slider. Both continuously adjust their estimates until 90'
  4. At 90', all see public signal, telling with 75% accuracy if their group is top or bottom-score one. Continue to update until second 180





Your counterpart is in the **same group** as you are and you each must estimate the likelihood you are both in the green group vs. the red group.

Asymmetric social adjustment of beliefs



- Phase 1: Beliefs quickly stabilize, similar under *Exchange* and *No Exchange*. On average, subjects in low IQ group hold upward biased initial beliefs about their assignment to the high IQ group
- Phase 2: Social exchange causes subjects' beliefs to partially converge, but some persistent disagreement. Most importantly, convergence is highly asymmetric, in two ways

1. Adjustment is systematically upwards Driven by relatively pessimistic subjects moving towards their relatively more optimistic counterparts. No systematic downward adjustment by optimists
2. Upward adjustment in beliefs is strongest for those in the low IQ group, for whom such movements necessarily decrease accuracy

- No such effect in no-motivation conditions: subjects continue with Phase 1 beliefs

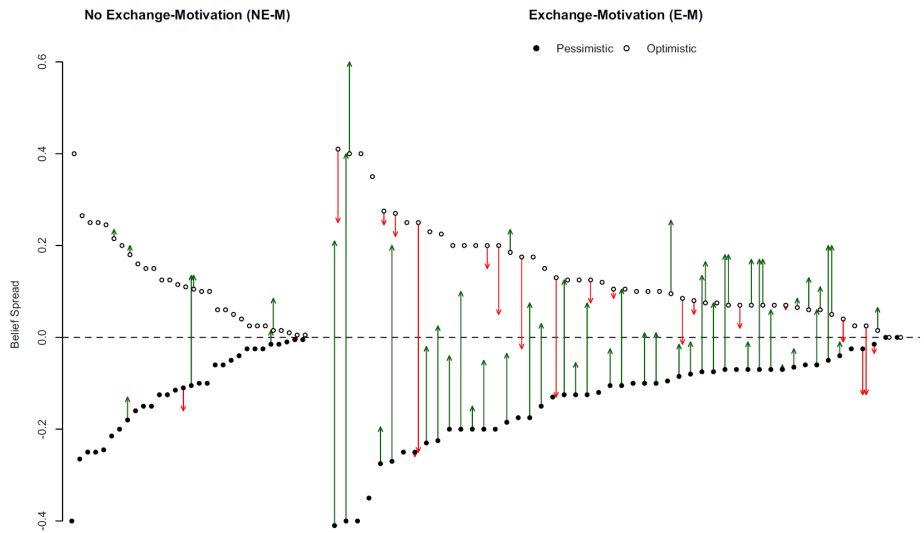


FIGURE 3. Initial belief differences and Phase 2 belief adjustments for all matched pairs in the E-M and NE-M treatments. Dots show beliefs at the 44th second for the optimistic (hollow dots) and pessimistic (solid dots) normalized symmetrically around zero. Arrows show adjustments in beliefs between the end of Phase 1 and the end of Phase 2. Green arrows show upward and red arrows downward adjustments.

- Social learning thus worsens bias on average: opposite of "wisdom of crowds"
  - Coins in jar $\neq$ your IQ!

Self-serving biases in beliefs about collective outcomes

- Kogan, Schneider & Weber 2021

1. Reasoning tasks: propose solutions for "knapsack" problemsof varying difficulties, get a score for how good
   - No globally optimal solution $\Rightarrow$ can never be sure that "got it right"
2. Elicit beliefs about relative performance, both before and after receiving signal with 2/3 accuracy
3. Compare three treatments:
   - *Individual:* compete on-on-one, winner gets prize
   - *Collective:* compete in teams of six, electronic chat together, then propose single solution. Same per-person incentives as under *Individual*
   - *Market:* teams of six again, then within each, trade assets that pay if team wins, or if team loses.
     Rationally, should want to bet against your team, to diversify risk (hedge).
     Here, bets offset each other,as in a clearinghouse (asset in zero net supply), price will adjust

Figure 2: Asymmetric updating in the Individual condition

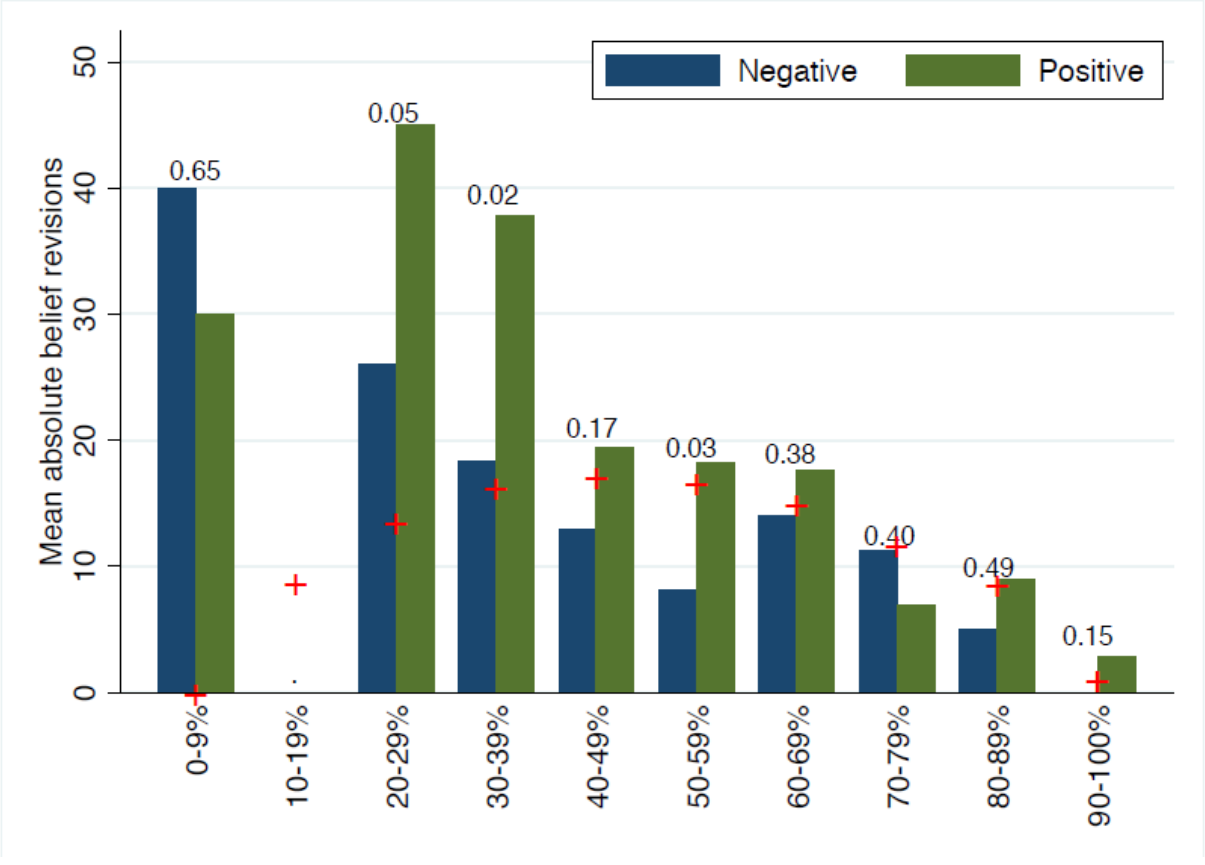


Figure 3: Asymmetric updating in the Collective condition

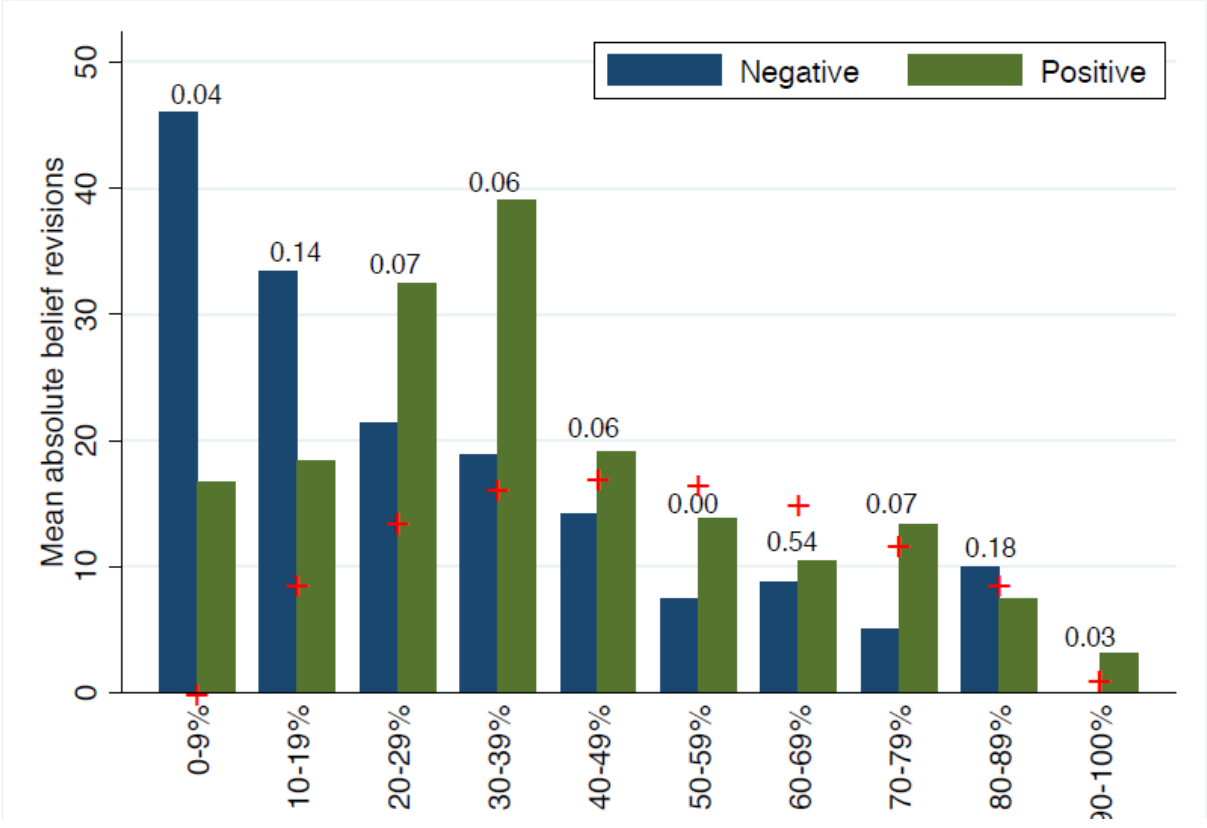
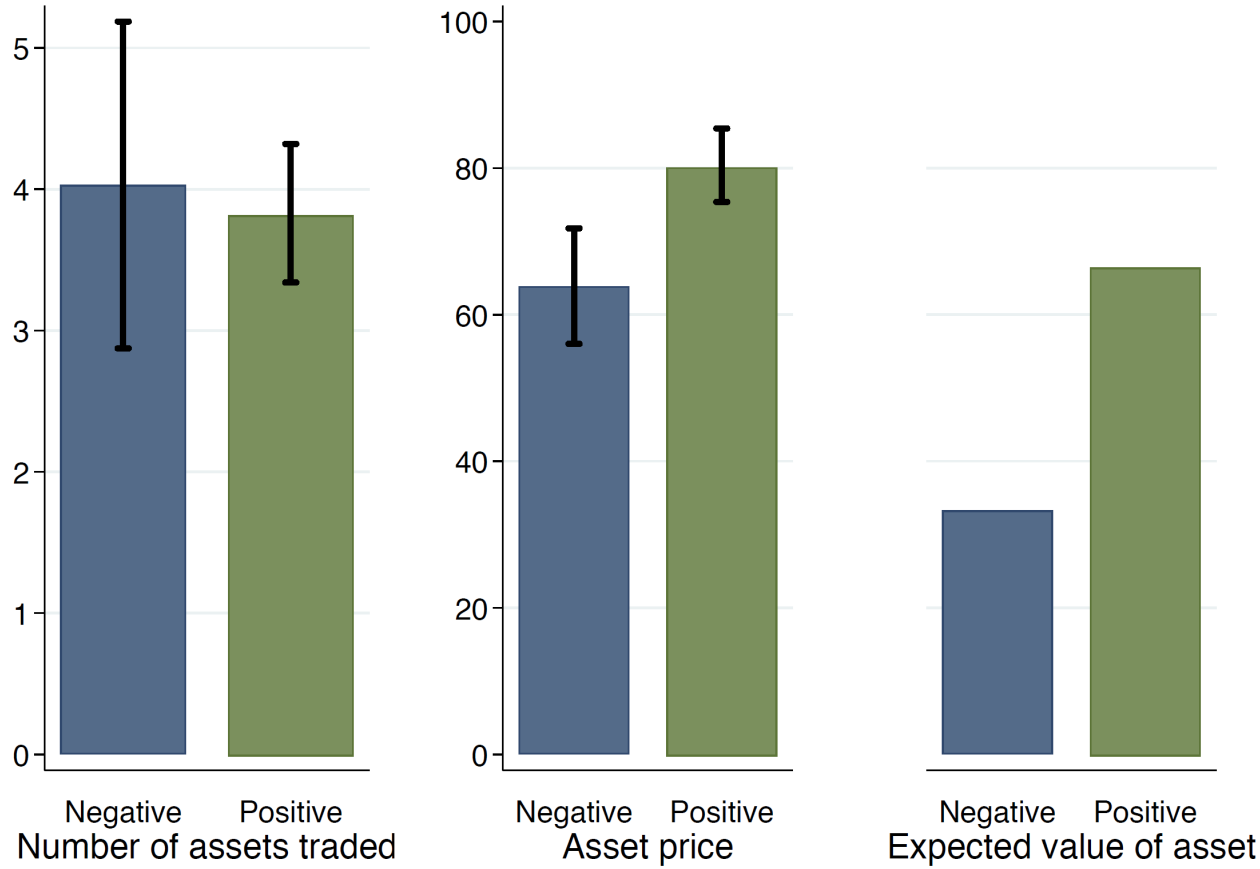


Table 1: Updating behavior in Individual and Collective conditions

Subsample:	Priors in (0,100)			Priors in [20,80]		
	Individual	**Collective**	**Difference**	**Individual**	**Collective**	**Difference**
$\widehat{\delta}_t$	0.627***	0.710***	-0.082	0.542***	0.642***	-0.100
	(0.094)	(0.057)	(0.108)	(0.120)	(0.075)	(0.140)
$\widehat{\beta}_{L,t}$	0.671**	0.678***	-0.006	0.642***	0.597***	0.045
	(0.123)	(0.054)	(0.133)	(0.112)	(0.041)	(0.118)
$\widehat{\beta}_{H,t}$	1.133	0.834**	0.299**	1.090	0.881*	0.209*
	(0.111)	(0.073)	(0.131)	(0.102)	(0.060)	(0.117)
N	160	475		159	459	
p($\widehat{\delta}_t == 1$)	0.001	0.000		0.001	0.001	
p($\widehat{\beta}_{L,t} == 1$)	0.014	0.000		0.004	0.000	
p($\widehat{\beta}_{H,t} == 1$)	0.243	0.045		0.391	0.072	
p($\widehat{\beta}_{L,t} == \widehat{\beta}_{H,t}$)	0.003	0.154		0.005	0.000	

*Note: Estimated coefficients of model (1). Priors in (0,100): Observations where people updated in the wrong direction or with a prior=0 or =100 are excluded. Priors in [20,80]: Observations where people updated in the wrong direction or with a prior<20 or >80 are excluded. Standard errors clustered at matched-individual/group level; Standard errors in parentheses; Coefficient is significantly different from 1 (Bayesian benchmark) at * - p < 0.1; ** - p < 0.05; *** - p < 0.01. p(H) gives the p-value for testing hypothesis H.*

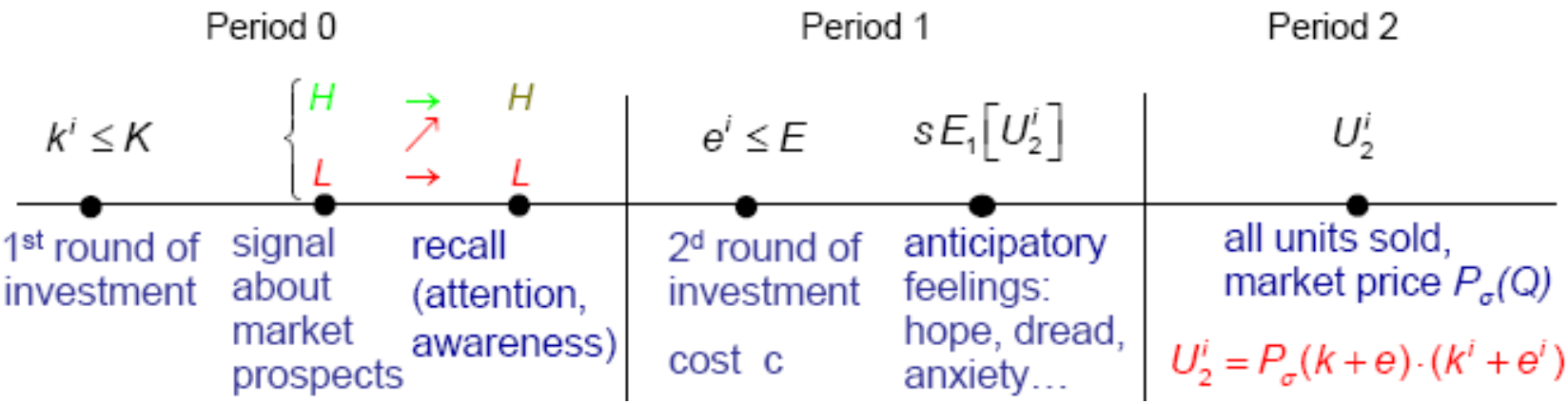
Exuberance: market further increases overoptimism..



Trading Volume and Asset Prices

- Particularly following bad news!

"Irrational Exuberance" in Asset Markets



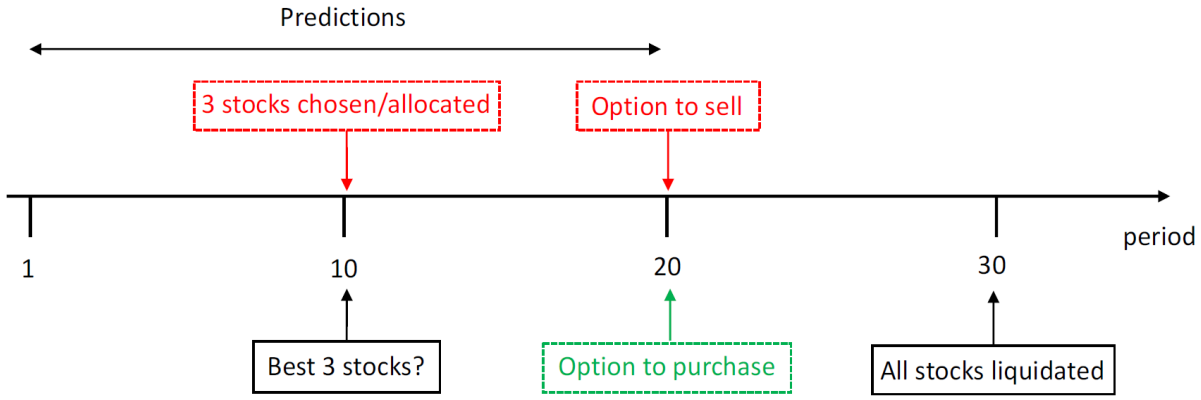
- Investors linked by final price, resulting from:
  - State of demand at $t = 2$ (unknown θ)
  - Total supply built up at $t = 0, 1$ and "unloaded" on the market at $t = 2$. Does other market participants' exuberance (denial of bad news) make each individual more or less likely to also be bullish?
- General obliviousness to weak fundamentals will further depress the (expected) final price: Glut, market crash $\Rightarrow$ two effects:
  - Substitutability: if bullish, keeps investing will lose even more money on e_i
  - Stakes: if bearish, even greater capital losses must be immediately acknowledged on outstanding position k^i

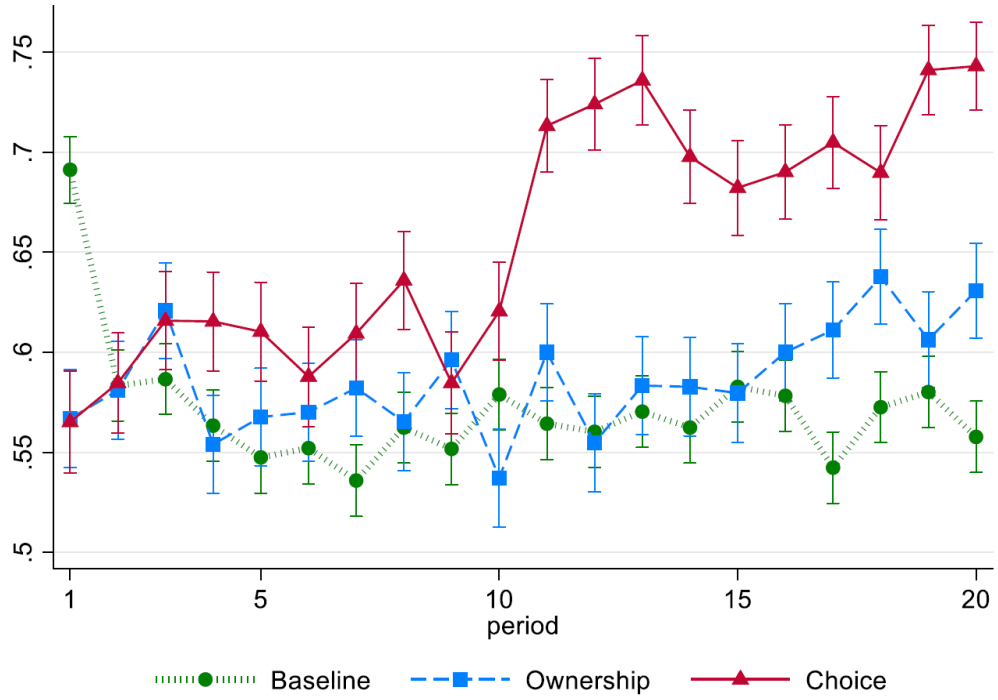
Implications

- Escalating commitment / sunk cost effects: the an individual has invested to date (k^i), the more likely he is to continue "blindly" / the less likely to be a realist
- Market momentum: the greater was *aggregate* prior investment (K), the more likely each agent is to continue investing "blindly"
- Market manias and crashes: over appropriate range of parameters:
  - A given asset market can have phases (equilibria) of realism and phases of blind "exuberance" in the face of bad news
  - Market mania leads to overinvestment and eventual deep crash

Motivated Beliefs About Stock Returns

- Cueva & Iturbe-Ormaetxe (2020). Study 1: lab, artificial stocks





Investor Memory (Godker, Jiao & Smeets 2021)

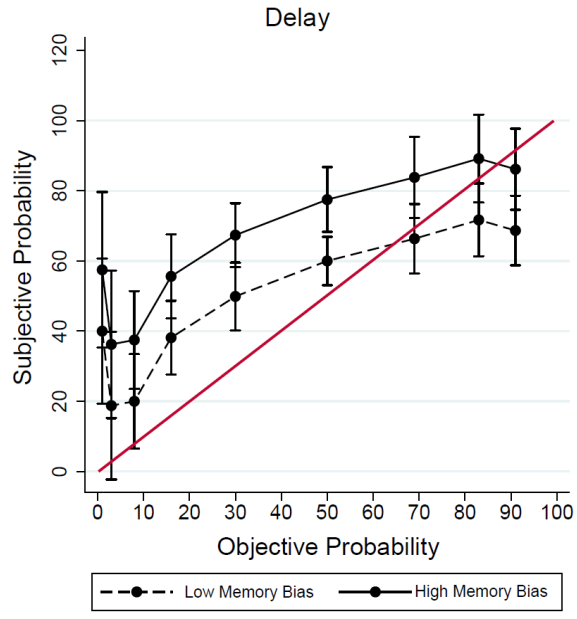
Table 1: Experimental Conditions

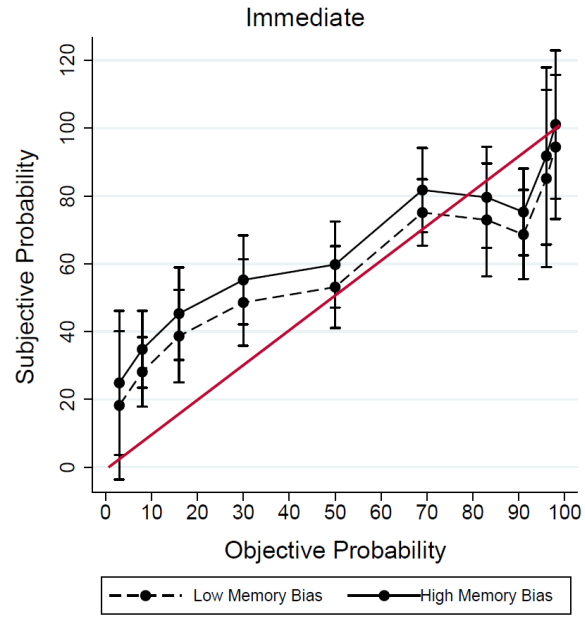
Treatment	First investment choice and observation of outcomes	Memory elicitation	Belief elicitation and second investment choice
Delay	Week t	Week t+1	Week t+1
Immediate1	Week t	Week t	Week t
Immediate2	Week t+1	Week t+1	Week t+1
NoRecall	Week t	No	Week t+1

Notes: This table provides an overview of the treatment and control conditions of the experiment with different time spans between tasks.

Table 2: Overview of subjects' investment options

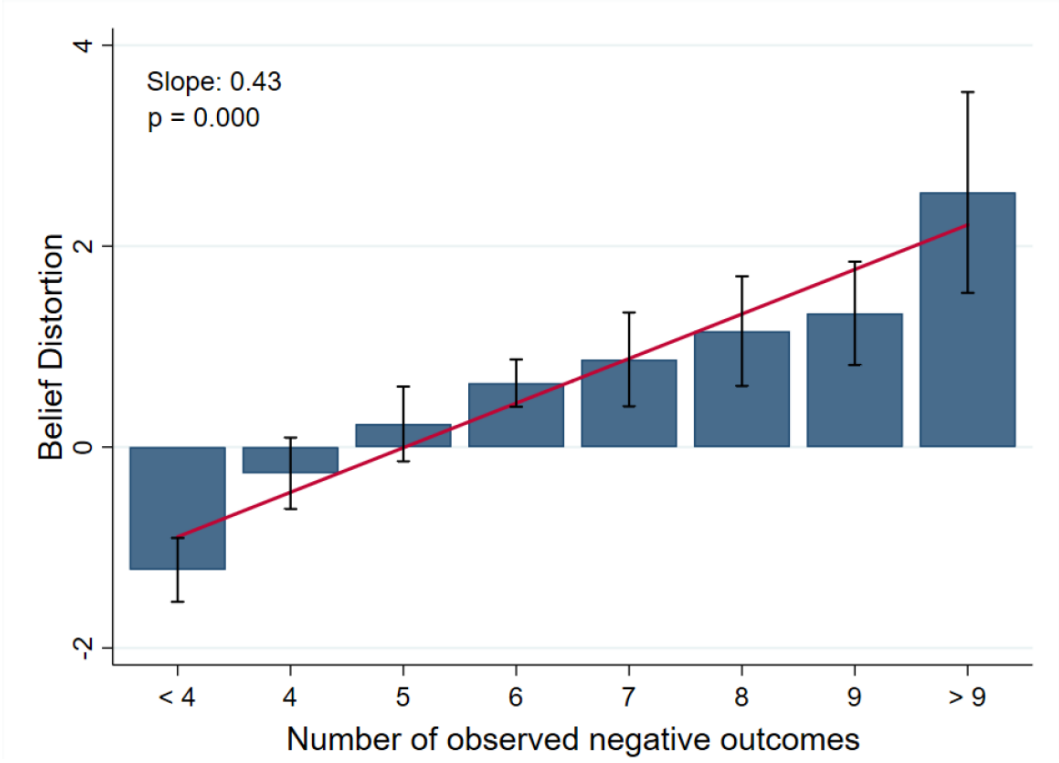
	Investment Option	**Risk about Asset Type**	**Asset Type**	**Possible Outcome(s)**	**Probability of Outcome(s)**	**Expected Outcome**
First Choice (Before Observation)	Stock	50% probability	Good Stock	11, 13, 15 EUR -5, -3, -1 EUR	60% 40%	6.60 EUR
		50% probability	Bad Stock	11, 13, 15 EUR -5, -3, -1 EUR	40% 60%	3.40 EUR
	Bond	No	-	3.10 EUR	100%	3.10 EUR
Second Choice (After Observation)	Stock	Based on Subjective posterior	Good Stock	11, 13, 15 EUR -5, -3, -1 EUR	60% 40%	6.60 EUR
		Based on Subjective posterior	Bad Stock	-5, -3, -1 EUR 11, 13, 15 EUR	60% 40%	3.40 EUR
	Bond	No	-	5.10 EUR	100%	5.10 EUR





	(1) Subjective Probability	(2) Subjective Probability	(3) Belief Distortion	(4) Belief Distortion
Memory Bias (for Pos. Outcomes)	6.196***		0.424***	
	(0.92)		(0.05)	
Memory Bias (for Neg. Outcomes)		-7.958***		-0.525***
		(1.02)		(0.06)
Objective Probability	0.684***	0.701***		
	(0.05)	(0.05)		
Constant	16.751***	15.204***	-0.185	-0.223
	(5.16)	(5.00)	(0.27)	(0.26)
Session	Yes	Yes	Yes	Yes
N	188	188	182	182
R^2	0.52	0.55	0.31	0.35

Biased recall leads to suboptimal reinvestment



	(1) Investment in Stock (Suboptimal)	(2) Investment in Stock (Suboptimal)
Memory Bias (for Pos. Outcomes)	1.563***	
	(0.19)	
Memory Bias (for Neg. Outcomes)		0.661***
		(0.09)
Constant	0.050***	0.0452***
	(0.052)	(0.047)
Session	Yes	Yes
N	188	188
Pseudo R^2	0.12	0.10

"Wall Street and the Housing Bubble"

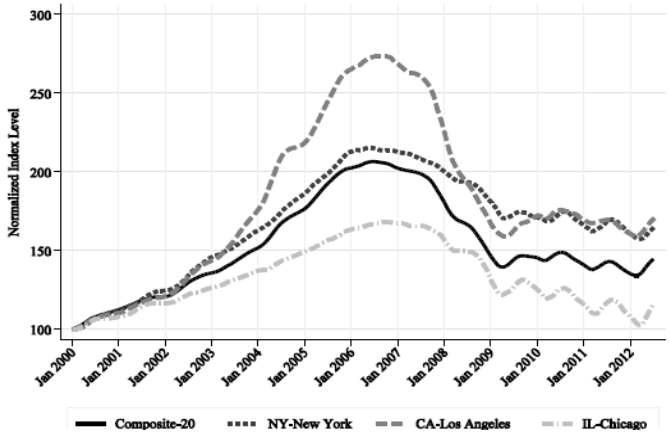
Cheng, Raina & Xiong (2014) ask: Bad Incentives or Bad Beliefs?

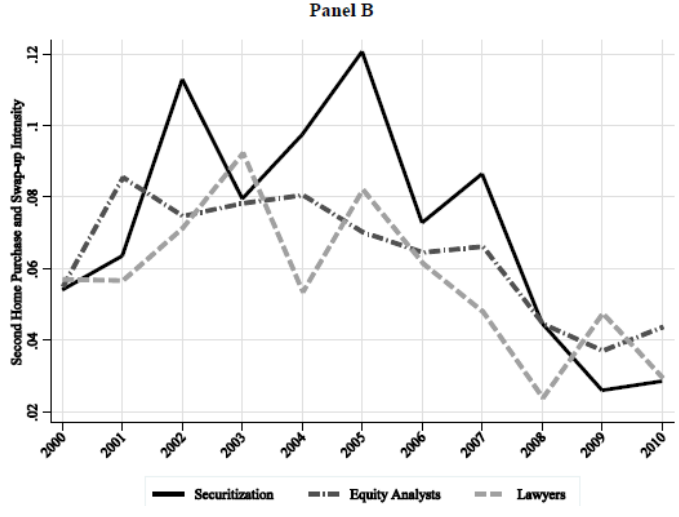
- Standard account: bad incentives led Wall Street to take excessive risks in the housing market, with disastrous consequences: securitizing mortgages with very lax screening of subprime borrowers, liar loans, etc.
  - Unscrupulous insiders, knowingly deceiving households, banks, investors
- But: what did insiders really believe? Can we tell?
- Identify + track down own housing transactions of 400 securitization managers, issuers, investors: "securitization agents" comprising vice presidents, senior vice presidents, managing directors, and other non-executives at major investment houses and boutique firms
- Control groups:
  - S&P 500 equity analysts who do not cover homebuilding companies
  - Random sample of lawyers who did not specialize in real estate law.

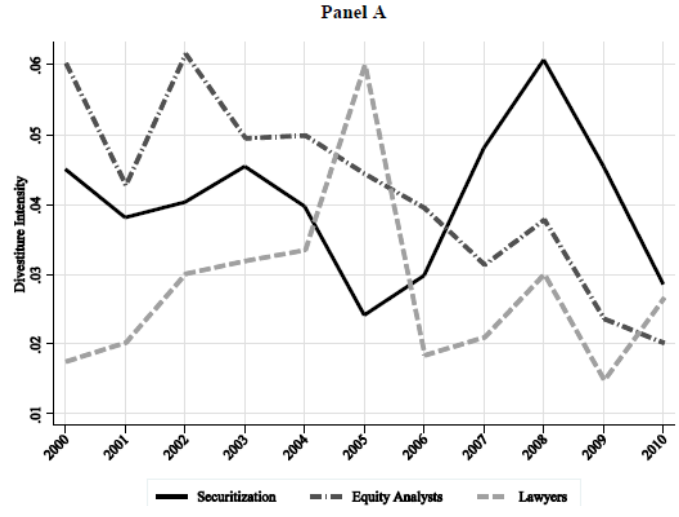
Second-home purchases and home divestures (sales)

Figure 1: Home Price Indices

This figure plots the Case-Shiller non-seasonally-adjusted home price indices from January 2000 through July 2012. Values for January 2000 are normalized to 100.







Key findings

- Securitization agents increased rather than decreased, their housing exposure during the boom period, particularly through second home purchases and swaps of existing homes into more expensive homes
- Were also much slower to sell once prices had started falling
- Difference not explained by interest rates or financing, and is more pronounced in bubblier Southern California vs. New York metro region
- Accords well with stakes-dependent beliefs
- As a result, securitization agents' overall home portfolio performance was significantly worse than that of control groups
- Agents working on the sell side and for firms which had poor stock price performance through the crisis did particularly poorly themselves.

Main Takeaways

1. Motivated beliefs and reasoning are ubiquitous, and important

   As Mark Twain said, *"Denial ain't just a River in Egypt"*

   - Telltale signs: information avoidance, asymmetric updating to good and bad news, stakes dependence, selective memory, self-signals, emotional responses
   - Different from "cold" biases and heuristics due to cognitive limitations
   - But adeptly hitchhike on, hide behind them: "just forgot, made an error..."

2. People trade off costs and benefits of belief distortions, instrumental or hedonic. Both sides can be large

   - Allows experimental manipulation / empirical identification
   - More promising "debiasing" channels than information, which rarely works

3. Social cognition: team morale vs. groupthink, ideology, market frenzies

   - Economic / social interactions, communication, can exacerbate individual delusions. Opposite of "wisdom of crowds
   - Private vs. social costs / benefits of motivated cognition are very different

4. Complementarities of theory, experiments, empirics. And of social sciences...

The Big One: Religion

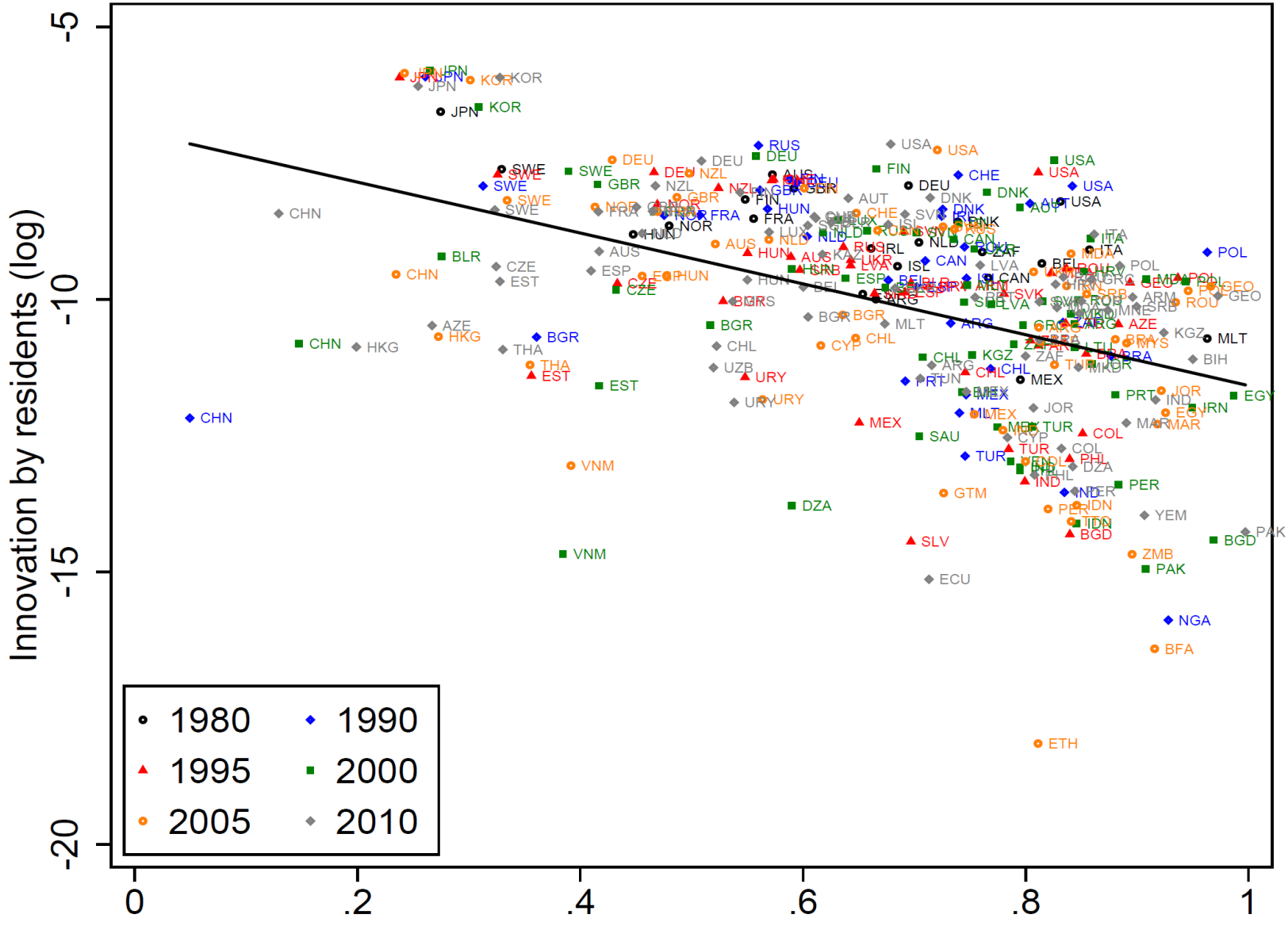
- Religion = key source of beliefs, values, norms
- Main mechanisms emphasized in sociology/economics of religion literatures:
  - Thrift and work ethics (M. Weber). Literacy, Education (Ec. History)
  - Morals, social norms, trust. (Evolutionary anthropology)
- Guiso, Sapienza, Zingales (2003): in World Values Survey, found more religious persons to be
  - More trusting: of others, of government and other public institutions, of market outcomes. Just-world beliefs
  - More trustworthy: less willing to break law, accept bribe, cheat on taxes
  - But also: more prejudiced toward other races and working women
  - Some differences across denominations
- Conclude that "On average, religion is good for the development of attitudes that are conducive to economic growth"
- But: recall that motivated beliefs always have both costs and benefits!

Forbidden Fruits: The Political Economy of Science, Religion & Growth Bénabou, Ticchi and Vindigni (2021)

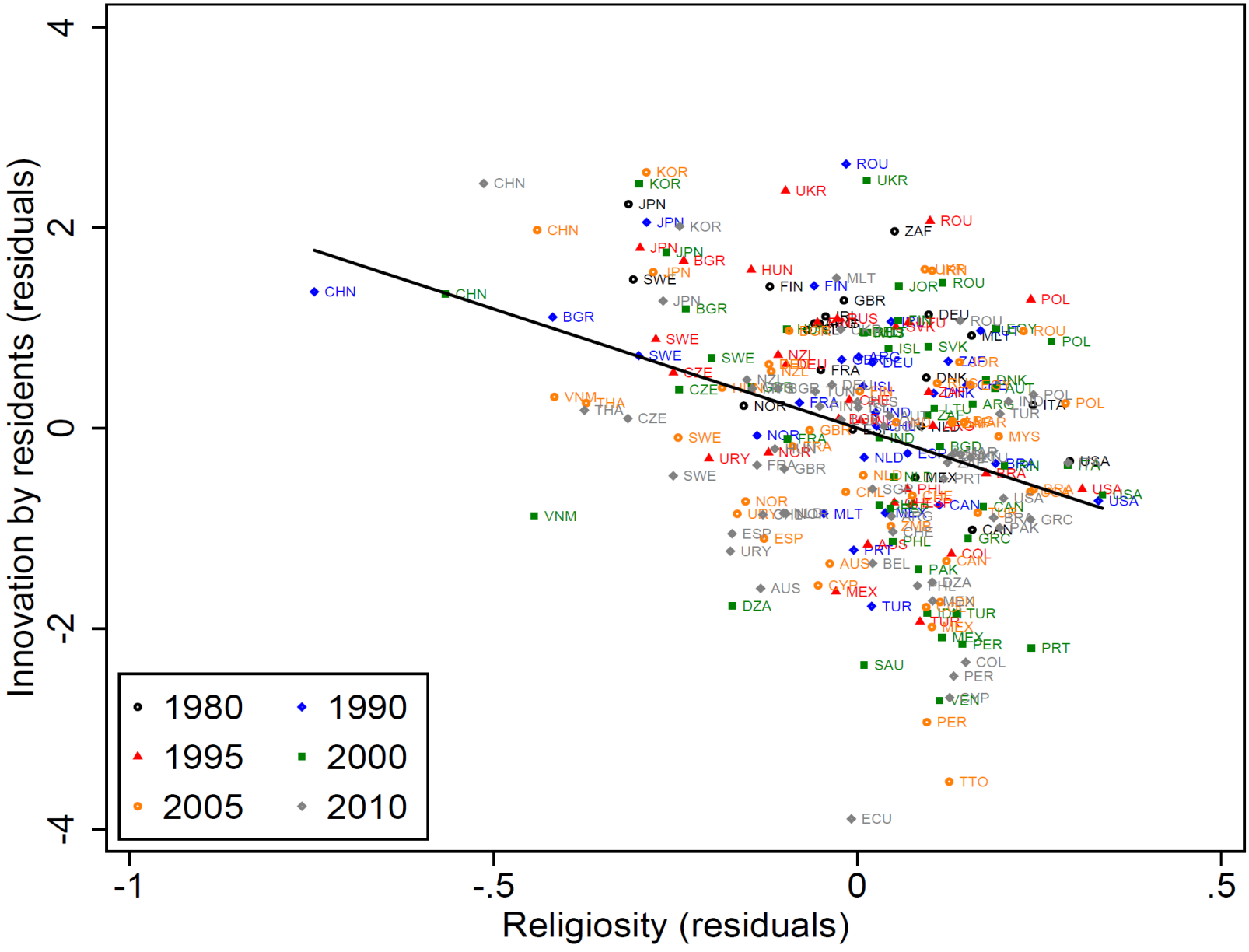
- Ultimate driver of long-run-growth = progress of knowledge and technology. Whole spectrum of innovation:
  - From advances in basic science to the diffusion of new technologies, economic practices, even social change (e.g., inclusion of women) $\Rightarrow$
- Important to examine extent to which religious beliefs, values, institutions conducive or detrimental to creativity & innovation
  - Revisit age-old theme: religion's relationship with science, unorthodox ideas, disruptive discoveries, free thought

Innovation and religiosity across countries

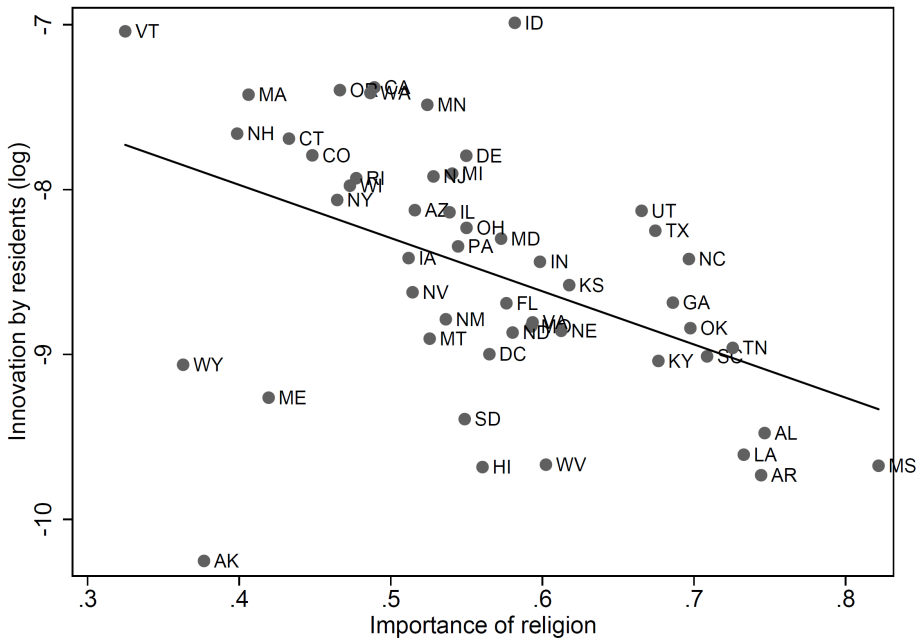
- Innovation = patents / capita

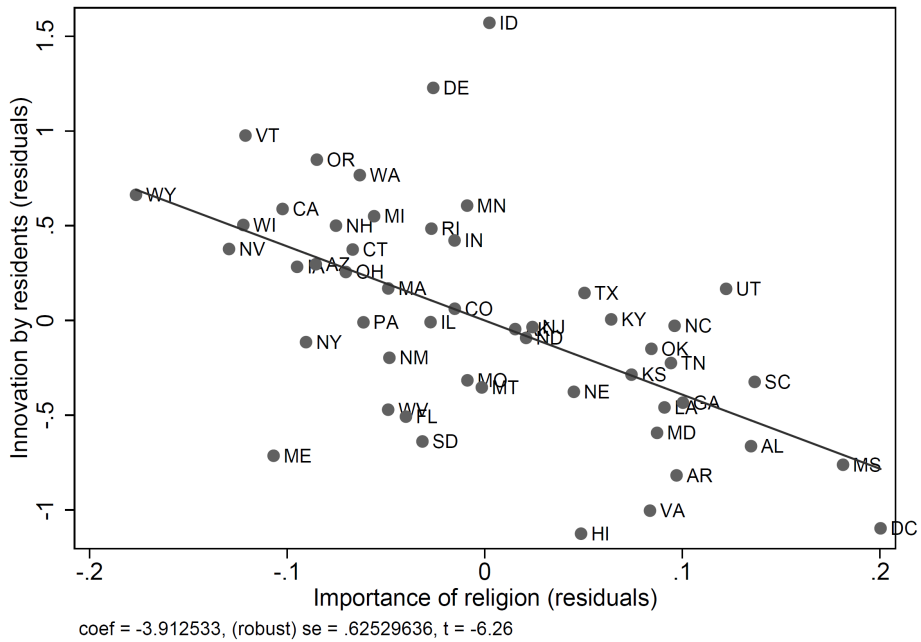


Controls: GDP per capita, Population, Religious Freedom, Intellectual Property Right Protection, Foreign Direct Investment, Years of Tertiary Schooling



Innovation and religiosity across U.S. states





- Controls (right panel): GSP per capita, Population, Fraction with at least Bachelor's Degree, Foreign Direct Investment,
- Both cross-country and cross-state results are robust to other measures of religiosity
  - Similar results on attitudes at individual level
- Paper models coevolution of knowledge, religiosity and politics
  - Can account for these and other empirical facts, incl. historical ones
  - Rising inequality $\Rightarrow$ emergence of Religious-Right coalition, anti-redistribution and anti-science